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► Socio-economic and labour market implications of the climate transition in Timor-Leste



- ▶ **Socio-economic and labour market implications of the climate transition in Timor-Leste**

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Foreword

Timor-Leste is at a critical juncture in planning for a more prosperous future for its people and its economy: The country must accelerate its economic growth and development while coping with heightened climate risks. As an oil-dependent economy, Timor-Leste grapples with the conundrum between activities that are output-enhancing as well as revenue-generating and environmental sustainability when considering climate mitigation actions (to reduce the rate of climate change) that are consistent with its national and international commitments. At the same time and given the country's vulnerability to climate dynamics, climate change adaptation (adjustment to actual or expected climate change) is becoming a compelling necessity.

To inform policy and practice with evidence and insights as Timor-Leste plans and implements its National Employment Strategy 2025–2028, the International Labour Organization assessed the impact of climate change on the country's economy, labour market, poverty and inequality. The study also looked at industries conducive to the desired economic diversification and the enhanced labour demand as well as environmental sustainability considerations. The analysis presented in this paper is complemented with short- and medium-term recommendations for supporting those industries and other economic opportunities while also ensuring decent working conditions for Timorese women and men.

Conducted during the first quarter of 2025 through primary and secondary research, the study is based on the ILO Guidelines on Green Employment Diagnostics for Just Transitions. The analysis presented here is intended to facilitate continuous, coherent and informed exchange between citizens, government entities, social partners and international development cooperation partners across policy areas covering planning, employment, environment protection and climate change. Such informed exchanges should align with the ILO and other global principles of a just transition towards environmentally sustainable economies and societies.



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Abbreviations and acronyms

ASEAN	Association of Southeast Asian Nations
CCP	National Climate Change Policy
ENSO	El Niño Southern Oscillation
GDP	Gross Domestic Product
ILO	International Labour Organization
ILOSTAT	ILO Statistics
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
KSTL	Konfederasaun Sindikatu Timor-Leste
LGBTQIA+	Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual and Other
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contributions
NDCC	National Directorate of Climate Change
SEFOPE	Secretariat of State for Vocational Training and Employment
SPREP	Secretariat of the Pacific Regional Environment Programme
TVET	Technical and Vocational Education and Training
UNFCCC	United Nations Framework Convention on Climate Change

Executive summary

After more than two decades of independence, Timor-Leste continues to experience structural challenges that are hindering its economic diversification and perpetuating its socio-economic vulnerabilities. The country's over-reliance on the oil sector makes it highly susceptible to risks associated with a climate transition (the ensemble of challenges associated with the shift to a low-carbon economy) while the impacts of the changing climate threaten livelihoods, infrastructure and economic stability. This paper examines that intersection of climate-related physical risks and transition risks with Timor-Leste's economy, labour market, poverty and inequality. It also explores possible palliative interventions and opportunities for green employment and economic diversification.

Structural challenges and climate change vulnerabilities

The country's economy heavily depends on its oil revenues to fund public spending, but those revenues have yet to generate the desired levels of private sector-led growth, economic diversification or employment. Climate change poses additional risk to these structural challenges, thus exacerbating the vulnerabilities and poverty traps. The associated physical risks, such as extreme weather events, rising temperatures and rainfall variability, have become a menace to the livelihood-generating sectors (like agriculture) and the sectors with great potential (such as tourism) while degrading critical infrastructure (roads, bridges and water and irrigation systems), all of which impact the country's productivity.

The shift from fossil fuel-based energy systems to sustainable, low-carbon alternatives, known as the global climate transition, is generating a "transition risk" for Timor-Leste's economy. Because the country relies on the oil industry for revenue generation, growth and job creation, changes in international practices, including lower demand and/or additional requirements for operation, may limit future revenues and reinvestment in the local economy. At the other end, the national transition based on the use of renewable energy, which could ease the diesel-import dependency and lower energy prices, remains limited and largely not self-sustaining.

The climate risks (both physical and transition) are disproportionately affecting vulnerable groups, disrupting livelihoods and worsening the multidimensional crises of poverty, food and water insecurity and health. With limited resources, the vulnerable groups often resort to maladaptive coping mechanisms, which may increase their vulnerability and lead to a broader deepening of inequality and adverse long-term outcomes.

Climate change implications and policy coherence

The study behind this paper found room for improving the coherence and alignment between development, employment and climate policies and for integrating the just transition principles into the country's policymaking. Although climate policies prioritize the more-sustainable economic industries, the development strategies remain oil-centric. Alignment between complementary issues for ensuring a just transition such as industrial policy (and provisions therein) and environmental sustainability, skills needs, green economic diversification or the social protection system and climate action, are also limited.¹ And although climate

¹ Climate action is a concept captured by Sustainable Development Goal 13, which calls for urgent, comprehensive and collective action to combat climate change and its impacts on the planet and its inhabitants. It relates to the action needed to implement the Paris Agreement and encompasses all mitigation, adaptation and loss and damage responses. Climate change mitigation refers to actions that reduce the rate of climate change. Mitigation policies do this by preventing or reducing emissions (for example, keeping fossil fuels in the ground) or enhancing and protecting the sinks that reduce greenhouse gases in the atmosphere (for example, forests, soils and oceans). Climate change adaptation refers to the process of adjustment to actual or expected climate change and its effects as the means to moderate harm and exploit beneficial opportunities.

actions and climate policies generally address the economic implications, they tend to have little consideration for the employment implications. Vice versa, the employment strategy lacks linkages to environmental sustainability and national climate actions.

Economic diversification and employment opportunities

Even with the challenges, the climate transition offers opportunities for economic diversification and job creation. The paper outlines the following six sectors that have promising potential for economic diversification and green employment, based on trends and opportunities linked to the global and national climate transition.

1. **Renewable energy:** Timor-Leste has abundant potential for solar, biogas and biomass energy that could provide energy access for marginalized and off-grid communities and reduce the country's reliance on diesel imports for energy generation while creating jobs in installation, operation and maintenance. International labour mobility opportunities – a sought-after priority employment-generation source – also exist for skilled workers in renewable-related infrastructure construction abroad, including within the region.
2. **Waste management:** Although limited in potential, waste management contributes to economic diversification via circular economy initiatives, such as composting organic waste, and could address urban waste challenges while generating employment in recycling enterprises and biomass distribution. However, concerns on the quality of the jobs created (occupational safety and health and formality) warrant hearty consideration.
3. **Nature-based solutions – agriculture and related industries:** Implementing nature-based solutions in sustainable agriculture, agroforestry, aquaculture and carbon sequestration, offers opportunity to improve livelihoods while enhancing ecosystem resilience. Pilot projects (described throughout the paper) have shown that nature-based solutions improve income, productivity and inclusion. Additionally, innovations in climate financing mechanisms, although not yet fully tapped, offer potential to support the initiatives.
4. **Nature-based solutions – tourism and ecotourism:**² When community-based, tourism has economic and job creation potential for local communities. Integrating nature-based solutions promotes the sustainable use of local value chains and conservation of the ecosystem and biodiversity while linking to potential marine and terrestrial park development.
5. **Construction:** Investments in infrastructure for climate resilience (infrastructure that supports adaptation) and climate-resilient infrastructure (infrastructure that can withstand climate impacts) are critical not only for adaptation efforts but also for improving economic productivity because it represents a crucial employment-generating opportunity. This includes roads, bridges, irrigation systems and flood defences. In addition, integrating green construction practices into infrastructure development will help environmental preservation and further reduce carbon emissions.
6. **Financial services:** Although a niche, the financial services sector is critical for creating economic benefit and supporting the funding for all the above promising directions. Leveraging climate finance will require specific expertise, which offers opportunity for high-quality employment (even if probably limited in number).

2 Here and elsewhere in the paper, inclusion of tourism under nature-based solutions is made for consistency with the updated Nationally Determined Contributions (2022), which mentions tourism development as part of the “nature-positive growth and transition approach”, or primarily the expansion of green tourism to implement nature-based solutions aligned with the National Biodiversity Protection Policy (GDRTL 2022, 5, 27, 29).

► **Figure 1. Industries with promising potential for climate transition-related economic diversification and job creation**

Planned climate actions	Growing sector and subsector	Employment opportunity
Low carbon transition	Renewable energy: ► Photovoltaic ► Biomass	Domestic: Renewable energy installer; operations and maintenance; co-fired or biomass power plant operator.
	Waste management: ► Circular economy ► Municipality-waste management	Waste management: ► Renewable energy installer; operations and maintenance; co-fired or biomass power plant operator. ► Municipality-waste facility manager
Nature-based solutions: ► Ecosystem based adaptation ► Nature-positive growth and transition	Agriculture: ► Sustainable agriculture: smart agriculture, eco-agroforestry, sustainable aquaculture ► Carbon sequestration	Agriculture: ► Conservation worker, park ranger or monitoring worker ► Field facilitator, environment specialist, project manager
	Tourism: Ecotourism	Tourism: Conservation worker (ecotourism facility operator), park ranger, ecotourism guide
Other adaptation and resilience-building: Climate resilience-infrastructure	Construction: Infrastructure for climate resilience, climate resilience infrastructure	► Construction labourer ► Design and engineering
Adjacent: Climate financing	Financial service: Climate financing	Green finance analyst, environmental economist, sustainability consultant

Policy options

After outlining the opportunities for economic diversification and employment generation stemming from the climate transition in Timor-Leste, the paper explores policy options and offers recommendations that can enable them, along with mitigating the potential adverse risks.

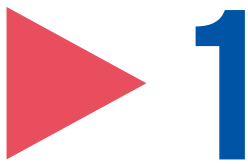
Together with the general recommendation to consider reprioritizing public expenditure and financial resources to support the national climate transitions, the paper concludes with the following suggestions for sectors with the most sizable economic and employment potential.

- **Nature-based solutions in agriculture and tourism:** Scale up successful pilot initiatives; strengthen extension services and other capacity-development support; leverage access to climate finance and carbon markets (including via blue and green carbon initiatives); and use public employment programmes for carbon sequestration to support implementation.

- ▶ **Renewable energy:** Expand off-grid solutions; assess the feasibility of introducing renewable energy options to the on-grid system; and explore potential labour-mobility partnerships for renewable energy development ideally in countries, such as Australia and ASEAN Member States, sizably investing in the latter.
- ▶ **Climate-resilient infrastructure:** Identify climate-proof infrastructure needs; design and implement climate action linked to public employment programmes for infrastructure development while seeking to strengthen the participation of local contractors, including small and medium-sized enterprises; and develop green standards and social and environmental safeguards for public infrastructure projects.

Additionally, the following cross-cutting interventions will allow the Timorese to support the previous recommendations and prepare the country for coping with climate risks when adopting a just transition approach.

- ▶ Adequate workforce-development planning and policies matching the economic diversification efforts.
- ▶ Incentives for private investment and support for green entrepreneurship.
- ▶ Reshaping international labour migration by incentivizing the use of remittances for climate adaptation purposes (private equipment, machinery, infrastructure), and the employment of the workforce abroad in dedicated green sectors; and by providing incentives for returning migrants, such as skills recognition.
- ▶ Community involvement and integration of traditional local knowledge within new green sectors (such as for environmental rehabilitation).
- ▶ A shift of the social protection system, from short-term disaster response interventions to a full-fledged adaptive social protection strategy; and integrating social protection, disaster risk management and climate change adaptation to build up resilience.
- ▶ Improved policy coherence between climate, economic development and employment domains, notably through reflection of the just transition principles in high-level policies, such as the Climate Change Base Law and the Nationally Determined Contributions.
- ▶ Use of social dialogue mechanisms for mitigating employment risks in any transition.
- ▶ Continuing investment in climate diplomacy to expand access to finance, technology and capacity. Timor-Leste should continue to leverage climate diplomacy and its status as a low-income Small Island Developing State to secure international financing and increase the climate funding inflow to support technology, infrastructure, private sector development, agriculture and human resource development while ensuring improved governance and project implementation.



Introduction

This *Socio-economic and Labour Market Implications of the Climate Transition in Timor-Leste* paper was produced within the framework of the International Labour Organization (ILO) project [Preparing Timor-Leste's Workers and Policy Makers for Just Transition and the Formal Economy](#). It provides a comprehensive assessment of the impacts of the changing climate conditions on Timor-Leste's economy and labour market. It does so by pinpointing the country's climate change vulnerabilities and the induced economic and labour-market impacts as well as the potential consequences on poverty and inequality.

Guided by the ILO [Guidelines on Green Employment Diagnostics for Just Transitions](#), the study behind this paper encompassed detailed analysis of the trends, challenges, risks and opportunities associated with climate change adaptation and mitigation. This paper collates the insights that can benefit the formulating of policies for attaining full and productive employment and ensuring a just transition to a resilient and low-carbon economy.

The study relied on available data, reports and analysis of the economic, employment and climate change landscape in Timor-Leste, corroborating the evidence with informant interviews.

1.1 Objectives

The study explored the nexus between climate change, economic development and the labour market as a stocktaking for future well-informed and coherent policymaking,³ with specific attention to the mandate of the Secretariat of State for Vocational Training and Employment and to the forthcoming implementation plan of the [National Employment Strategy 2017–2030](#). Additionally, to ensure their active involvement in a resilient, low-carbon and just transition, suggestions for national stakeholders, trade unions, employers' organizations and civil society organizations were to be developed.

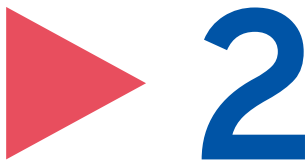
The study revolved around three investigations: (a) the current and potential national labour market, identifying sectors with opportunities for green jobs⁴ creation and sectors that may be vulnerable to the climate transition to a greener economy and to more sustainable production; (b) the implication of the transition on the economy, the labour market, poverty and inequality; and (c) policy options to mitigate the negative effects of climate change, economic transformation and environmental challenges on the labour market and people's standard of living.

3 Lessons learned by other climate transition processes around the world indicate that “enhanced policy coordination, social dialogue and partnership at planning, design and implementation stages” are critical means to achieve a just transition (ILO 2022, 11).

4 In the present study, green jobs are intended as decent jobs that produce goods, provide services or make production processes more energy and resource efficient and less polluting. Green jobs exist and can be created in traditional sectors, such as manufacturing and construction, or in new sectors, such as renewable energy and energy efficiency.

1.2 Structure of the paper

The paper is organized in five chapters: Beyond this first background chapter, Chapter 2 outlines the study's methodology, how the Guidelines on Green Employment Diagnostics for Just Transitions were applied and the study's limitations. Chapter 3 presents the situation analysis findings, examining Timor-Leste's economy, labour market, poverty and climate contexts as well as the related policy framework covering climate change (mitigation and adaptation), economic development and employment strategies and programmes. Chapter 4 outlines the risks and opportunities from the climate transition for the economy, the labour market and the reduction of poverty and inequalities before outlining the promising prospects for economic diversification and employment generation. Chapter 5 then concludes with economy-wide and sectoral policy options to support the strategic economic activities cited in the previous chapter.



Study methodology

2.1 Approach and methodology

As noted, the study followed and adapted the ILO's [Guidelines on Green Employment Diagnostics for Just Transitions](#) methodological framework (see figure 2). Situation (including institutional) analysis based on secondary data was supplemented with interviews with national ILO partners – the Secretariat of State for Vocational Training and Employment (SEFOPE), Konfederasaun Sindikatu Timor-Leste (KSTL) confederation of trade unions and the Chamber of Commerce and Industry Timor-Leste, along with interviews with and data from institutions involved in economic and environmental policies and programmes (line ministries, development partners and civil society organizations).

Secondary data were culled from the ILO Department of Statistics (ILOSTAT), the National Institute of Statistics and the World Bank's Group Open Data, as well as from relevant reports and publications from development partners, civil society organizations and academia, along with relevant laws, regulations and government policy documents.

The analysis targeted four interrelated issues: (a) climate change and the environment; (b) the economy; (c) the labour market; and (d) poverty and inequality. Structural changes and dynamics within and across these components and triggered by climate change in the form of physical risks,⁵ transition risks and opportunities⁶ were explored.

Aligned with the Green Employment Diagnostics guidelines, the analysis followed a three-step approach:

Step 1: Profiling Timor-Leste's characteristics. The analysis began with the situation (and institutional) analysis, in which the country's environment and climate change patterns, its economy and labour market and its goals to reduce poverty and inequalities were profiled. This initial analysis used available secondary information.

Step 2: In-depth analysis of the climate change, economic, labour market and poverty and inequality dynamics. Based on the country profiling and issues mapping, this step involved detailed analysis of the climate-induced impacts on the economy, the labour market and poverty and inequality levels. The analysis operated under the hypotheses that climate-related risks and opportunities, which manifest through physical impacts, measures and policies, will create structural changes affecting the economy nationally and in sectoral and geographical hotspots. These changes will subsequently impact, directly or indirectly, the labour market dynamics and the country's poverty and equality contexts. The detailed exploration focused on the

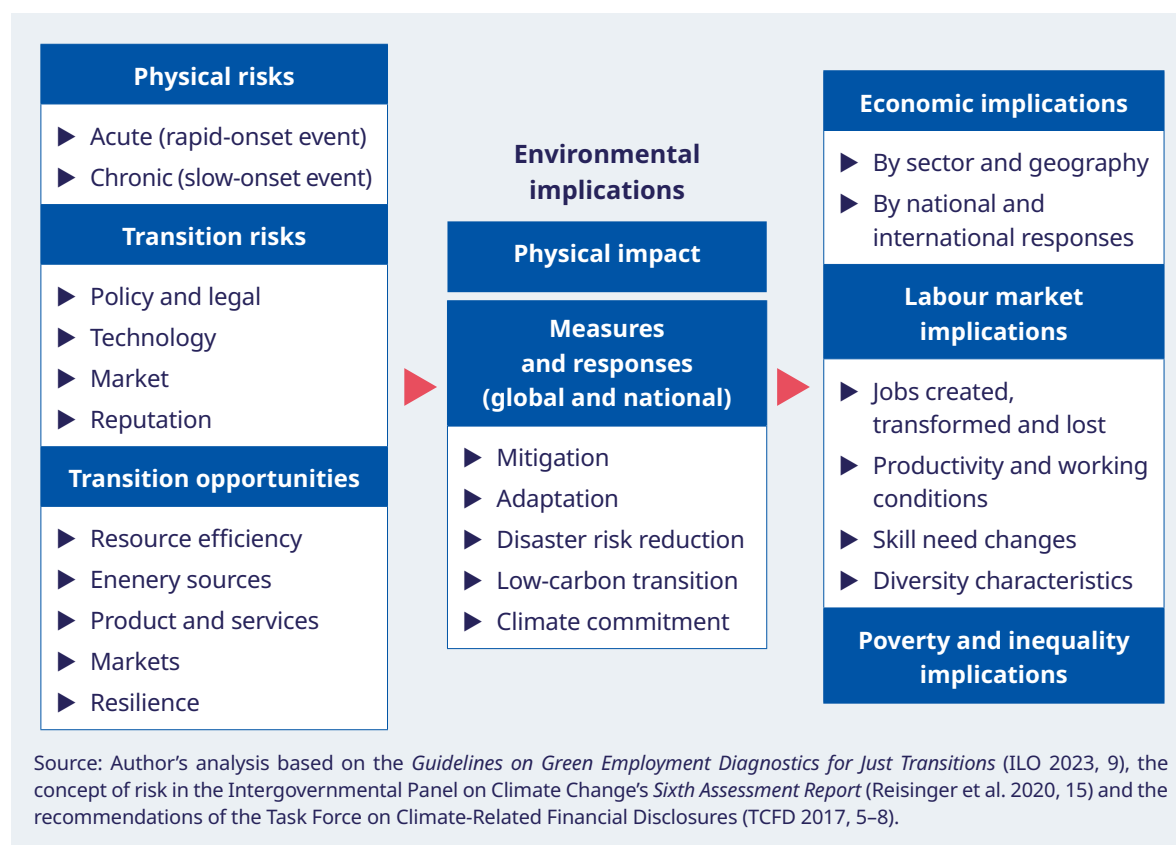
5 The physical risk describes the potential for physical damage and disruption to people, property and productivity as a result of the increased exposure to climate hazards driven by climate change, such as damage to property and infrastructure due to extreme weather events (floods, droughts and wildfires).

6 Transition risks and opportunities refer to risks or opportunities arising from the transition away from fossil fuels and other greenhouse gas-emitting activities, such as the transition to a lower-carbon economy. These are the results of the uncertainties that can arise from changes in policy, regulation, technology and activities necessary for the transition.

issues that emerged in the profiling step to corroborate the findings where possible via a desk review and informant interviews. Twelve interviews were conducted with institutional officials from government bodies, workers' and employers' organizations, development partners and civil society organizations relevant to the components of the analysis (see Annex I for the list of the 12 informants).

Step 3: Exploring economic opportunities and instrumental policy options. The final step consisted of exploring and elaborating policy options to mitigate the negative effects of climate change, economic transformation and environmental challenges on the labour market and people's livelihoods, possibly promoting green employment and contributing to the country's overall socio-economic advancement. The analysis aimed to inform the implementation plan of the [National Employment Strategy 2017–2030](#) as well as general policy and programme implementation by integrating associated elements of a just transition and a climate transition plan. Suggestions target non-government actors, including workers' and employers' organizations and civil society organizations, to support their involvement in the low-carbon transition, especially via social dialogue mechanisms.

► **Figure 2. Methodological framework for the study: Climate-related risks, opportunities and green employment**



2.2 Limitations

Despite the attempt to ensure completeness of information and analysis, the paper hinges on information not necessarily of the desired depth or coverage. Additional data on size, number and production of economic units by industry or on implementation and impact of public programmes would have been useful but were not available. Extended primary data collection through interviews would have increased the accuracy of the findings.

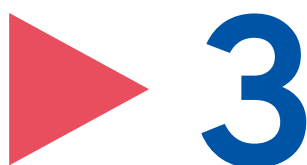
Having won independence in 2002, Timor-Leste is a young country democratically as well as demographically. Some 72 per cent of its nearly 1.4 million population is younger than 35 years.⁷ Various assessments have concluded that sizable progress has been made in reconciling peace and with the rebuilding of public services and some basic infrastructure, but the country's economy remains fragile due to an under-diversified private sector and high dependency on government spending and natural resources revenue (World Bank 2024b, 1; IMF 2024, 2–3; UN 2023, 4). This situation is reflected in the country's socio-economic indicators, with 45.9 per cent of the population living in poverty and 36 per cent facing chronic food insecurity (UN 2023, 16 and 4). Decent employment opportunities remain scarce, especially for young people, due to the lack of economic diversification and private sector investment (World Bank 2024b, 1–2; UN 2023, 16–17). In response, the Program of the IX Constitutional Government prioritizes economic diversification and job creation, emphatically recognizing that “without investment, there are no jobs; without jobs, there is no peace” (GDRTL 2023).

Unfortunately, this vulnerability is intensified by environmental factors. As a small tropical island nation, Timor-Leste experiences noteworthy environmental challenges. Its geographical location in the Pacific Ring of Fire makes it prone to natural disasters, with cyclones being a constant threat. Climate change has increased the probability and frequency of climate hazards (World Bank and ADB 2021, 2). Cyclone Seroja, which hit in 2021, left considerable economic and physical damage and revealed the country's sizeable gap in disaster resilience (World Bank and ADB 2021, 6). The increased frequency and intensity of climate-induced hazards also have exacerbated food and water insecurity and affected livelihoods (WFP 2023, 9–11). Vulnerable groups, including people with disabilities, women, children and marginalized persons, face greater risks (UN 2023, 5; IFRC 2021, 4; Oxfam 2021, 1–2).

Overall, these vulnerabilities have curtailed Timor-Leste's development and may be compromising its future prospects. The country is among the United Nations' least developed countries, and although it has exceeded the income per capita threshold⁸ (thanks to the petroleum revenue contributions) and is nearly meeting the graduation criteria for human assets, its economic and environmental vulnerabilities are considerable, as indicated by the Economic and Environmental Vulnerable Index score of 41.3. That score puts Timor-Leste at just above the average of the least developed countries, at 40.6 (UNDESA 2024). These realities expose the intricate nexus between the environment, development, jobs and equality in the country. Thus, sustainable development in Timor-Leste hinges on tackling the structural challenges in the country's economy while mitigating the climate-change impacts and strengthening its disaster resilience (MFAC 2024, 2–4).

⁷ According to the 2022 Census data from Timor-Leste National Institute of Statistics (INETL) (2023).

⁸ The least developed country list is reviewed every three years and is based on three criteria and thresholds of inclusion: (a) income criteria for the past three years of GNI per capita of US\$1,088 for inclusion and US\$1,306 or more for graduation; (b) human assets index consisting of health and education indicators, with the thresholds for inclusion and graduation at 60 or older and 66 or older, respectively; and (c) the Economic and Environmental Vulnerable Index, with the thresholds for inclusion and graduation at 36 or older and 32 or younger, respectively (UNCTAD, n.d.).



Situation analysis

3.1 Environment context

Located in South-East Asia, Timor-Leste consists of 14,954 square kilometres of land in its eastern half and the small enclave of Oecusse in the west of Timor Island and the nearby small islands of Atauro and Jaco (GDRTL 2021, 15). It has a tropical and mountainous climate heavily influenced by the West Pacific Monsoon and the El Niño Southern Oscillation (ENSO). This geographical feature puts it at high risk of cyclones and heavy rainfall (World Bank and ADB 2021, 2).

Despite a low-carbon emission, at 0.001 per cent of global emissions (Ritchie, Rosado and Roser 2020),⁹ zero net deforestation (Global Forest Watch 2023) and vast forest area (see table 1), Timor-Leste wrestles with climate-related risks. Various changes of climatic conditions include increasing average temperature, mean annual rainfall and rain variability, floods and droughts, increases in sea surface temperature and sea level and extreme events (GDRTL 2022a, 9–10; IFRC 2021, 7–9). In turn, these events are threatening the country's food and water security, the livelihoods of residents dependent on natural resources, the security of people living in hazard-prone areas and the health and welfare of people in general.¹⁰

► **Table 1. Environmental indicators in Timor-Leste**

Indicator	Data	Year
Greenhouse gas emissions	4.82 million MtCO ₂ e	2023
Forest area (% of land area)	61.8	2022
Degree of physical risk (International Monetary Fund-adjusted INFORM Risk)	4.2 (medium)	2022
Comparative advantage for low-carbon technology product	0.08	2022

Source: Our World in Data, World Bank; and Climate Change Dashboard, IMF. Accessed 10 February 2025

⁹ The *Second National Communication to UNFCCC (2020)* identified energy as the most significant emissions contributor (at 84.03 per cent), followed by agriculture, at 12.6 per cent, and waste, at 3.42 per cent, based on 2015 data (3.83 MtCO₂e of total emissions). There is no available information on the sectoral contribution for the current emissions.

¹⁰ The *Updated NDC (2022)* cited water, agriculture, fisheries and public health as the most climate-vulnerable sectors, aligned with the *Second National Communication to the UNFCCC (2020)*, which mentioned agriculture, water resources, forestry and public health.

Given the pre-existing limited infrastructure and inadequate social welfare, Timor-Leste is considered one of the most vulnerable countries in Asia to natural disasters and climate change, with a worsening outlook due to the current global climate change conditions (IMF 2022, 2–3; World Bank and ADB 2021, 2). To some extent, the capacity limitation is also reflected in the country's little comparative advantage for low-carbon technology products (see table 1).

This condition is echoed in several assessments on climate vulnerability that highlight how Timor-Leste has a relatively low hazard exposure compared with several of its neighbours but has high vulnerability due to lack of capacity to cope with the climate change impacts, consisting of financial, infrastructure and institutional limitations. For instance, Timor-Leste ranks 86 on the INFORM Risk Index,¹¹ making it worse off than 191 other countries in the medium climate risk category (EC-DRMKC 2025).

As for the risk class (see figure 3), when compared with other South-East Asian countries, such as Indonesia, Malaysia and the Philippines, Timor-Leste fares better in terms of climate risk exposure, but its disaggregated score indicates that its vulnerability is driven by lack of preparedness. This situation is confirmed by the INFORM Risk Index, most notably on all socio-economic indicators and lack of coping capacity, especially in the institutional, infrastructure and disaster risk reduction indicators (see the lefthand side image in figure 3). In the Notre Dame Global Adaptation Initiative Index (another climate vulnerability assessment), Timor-Leste ranks 138 among 187 countries (Notre Dame University 2022). Such score high vulnerability results mainly from the need to gear up adaptation (see the righthand side image in figure 3). Timor-Leste could thus potentially have a relatively high return from effective climate adaptation, but there remain barriers to effective implementation.

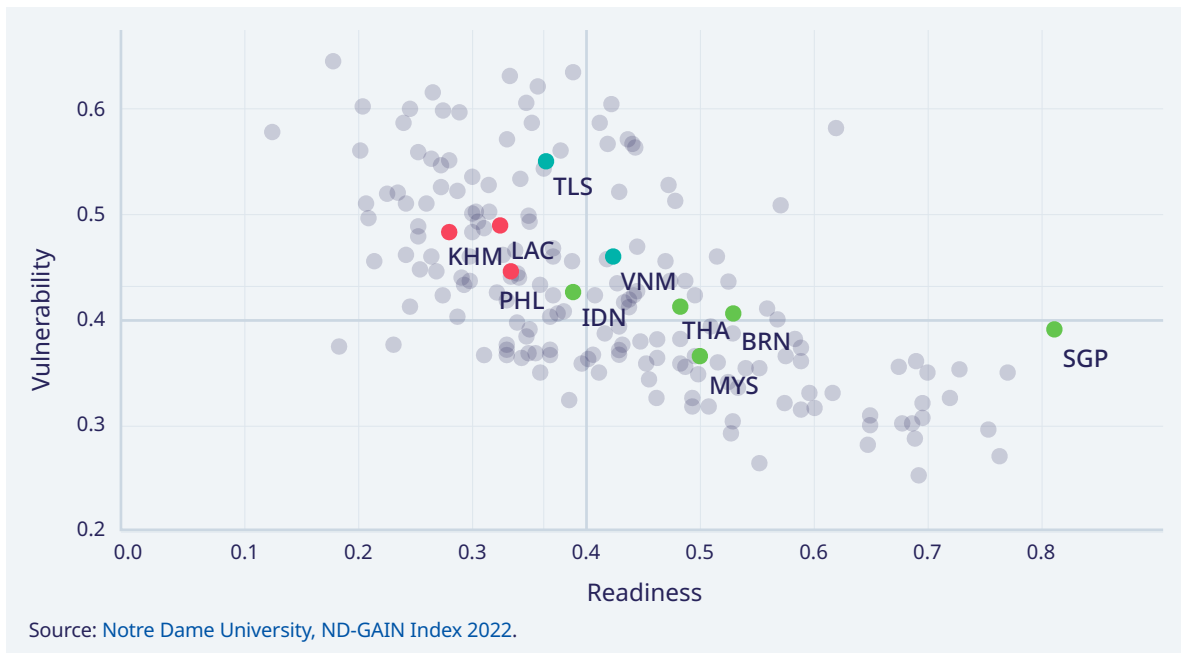
► **Figure 3. Timor-Leste's climate vulnerability, 2025 and 2003–22**

Country	Inform risk	Risk Class	Rank	Hazard & Exposure	Vulnerability	Lack of Coping Capacity
TLS	3,6	Medium	86	1,9	4,3	5,6
THA	4,4	Medium	51	6,1	3,7	3,9
VNM	3,7	Medium	79	4,6	2,7	4,0
SGP	0,7	Very Low	191	0,6	0,5	1,0
PHL	5,4	High	35	8,4	4,7	4,1
MYS	2,9	Low	115	2,6	3,4	2,9
LAO	3,4	Medium	92	2,1	3,4	5,6
IDN	4,8	Medium	45	7,5	3,4	4,3
KHM	4,3	Medium	56	2,7	4,9	5,9
BRN	2,4	Low	144	1,4	3,0	3,5

Source: DRMKC-INFORM, INFORM Risk Index 2025 for selected countries

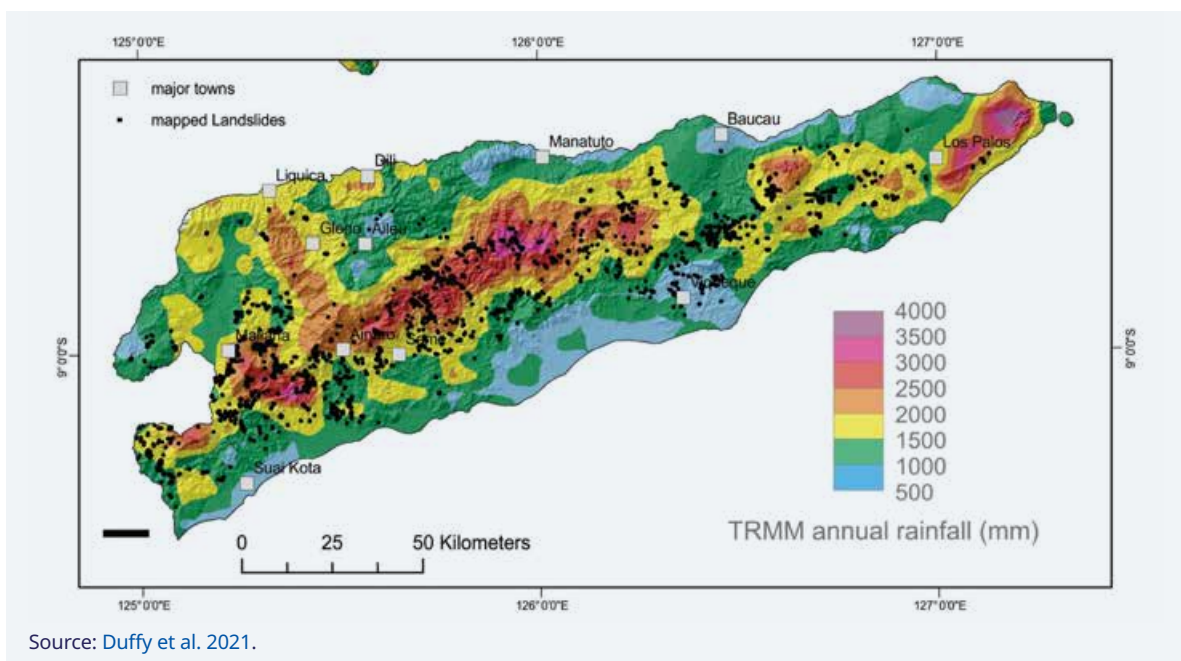
¹¹ The INFORM Risk Index is a global, open-source risk assessment for humanitarian crises and disasters and is a collaboration of the Inter-Agency Standing Committee Reference Group on Risk, Early Warning and Preparedness and the European Commission. It is managed by the Disaster Risk Management Knowledge Centre.

► Figure 3. (cont.)



The geographic and socio-economic contexts in turn determine the climate vulnerability – both from slow and rapid onset events. When interviewed for this study, representatives of the National Directorate for Climate Change (NDCC) and the Ministry of Agriculture, Livestock, Fisheries and Forestry echoed a previous report (Oxfam 2021, 1) that highlighted the climate-impact geographical difference, with Dili experiencing permanent land loss and infrastructure damage from flooding and landslides (see figure 4). At the same time, they pointed out, rural mountainous areas experience landslides and droughts along with the disruption of agricultural production due to the erratic weather conditions, which leads to food and water scarcity. Additionally, these representatives noted, climate change has disrupted the natural and biodiversity conditions, in some cases leading to increased risk of wildlife attacks on humans.

► Figure 4. Map of Timor-Leste with rainfall, elevation and landslide distribution



Timor-Leste is projected to endure hotter climate, increasing climate hazards, including extreme rainfall and intense tropical cyclones, and heightened risk of flash flooding, landslides and coastal storms (IFRC 2021, 10). These projections highlight the need for localized adaptive efforts. Failure to respond will not only impede the country's growth but put lives at risk (see table 2). However, such response needs to address both the climate change-induced events and the root causes of the country's socio-economic vulnerabilities.

► **Table 2. Selected environmental vulnerability indicators of the Economic and Environmental Vulnerability Index, 2024**

Indicator	Statistical value (0-100)	Index (0-100)
Remoteness and land-lockedness	63.7	67.1
Share of population in low-elevation coastal zones	3.0	8.5
Share of population living in drylands	3.1	3.1
Victims of disasters	1.08	53.9

Note: A higher index score represents greater vulnerability. The Economic and Environmental Vulnerability Index is a composite measure designed to assess the structural vulnerability of countries and is part of the assessment criteria for least developed country graduation. Each of the indicator values (statistical number) is normalized into index numbers (0–100) using a maximum–minimum scaling procedure, with fixed upper and lower boundaries imposed to avoid distortion from outliers or extreme values. See Cariole 2010 for detailed explanation of the Index calculation, including the upper and lower boundaries for each indicator and UNDESA, n.d. for detailed information for each indicator.

Source: UNDESA 2024.

3.2 Economic context

Timor-Leste is a lower-middle-income country with an economy reliant upon natural resources. The [Petroleum Fund](#), a sovereign wealth fund established from past oil and gas sales proceeds, finances most of the government expenditures, disbursed via the State budget mechanism.¹² The agriculture sector contributes around 16 per cent of gross development product (GDP) and 26.9 per cent (ILO 2023) of employment and non-oil exports (90 per cent of which is represented by coffee). The non-oil manufacturing sector remains barely developed, while the service sector heavily depends on public administration as a major employer (see table 3).

The country's dependence on oil revenue adds to its vulnerability. Although the Petroleum Fund provides ample fiscal buffer, with the current balance equalling 10.5 times the value of the annual GDP ([World Bank 2024b](#), 12), years of considerable withdrawal and depleting reserves could fully exhaust it by the middle or the end of the 2030s ([Kingsbury 2025](#); [IMF 2024](#), 1; [World Bank 2024b](#) 12). The dependency on oil revenue is alarming, considering the heavy GDP decline in 2023 that coincided with the depletion of the Bayu-Undan oil field (see figure 5).

Sustainable economic diversification is thus crucial to avoid this resource curse, as continuously emphasized in government programmes, including the current (IX) administration.

¹² Although previous monitoring reports showed that the Petroleum Fund has been contributing to more than 80 per cent of the government expenditure since 2010 ([La'o Hamutuk 2022](#); [Scheiner 2022](#); [Scheiner 2021](#)), the projected Petroleum Fund's use, or estimated sustainable income and excess of withdrawal, under the [proposed 2025 State budget](#) equals 73.5 per cent of all expenditure (MOF 2024). The Petroleum Fund is solely disbursed through the State budget, with no guidelines for sectoral disbursement or expenditure type. The estimated sustainable income indicates the disbursement ceiling for the sustainable use of the funds.

► Table 3. Economic indicators in Timor-Leste, 2023

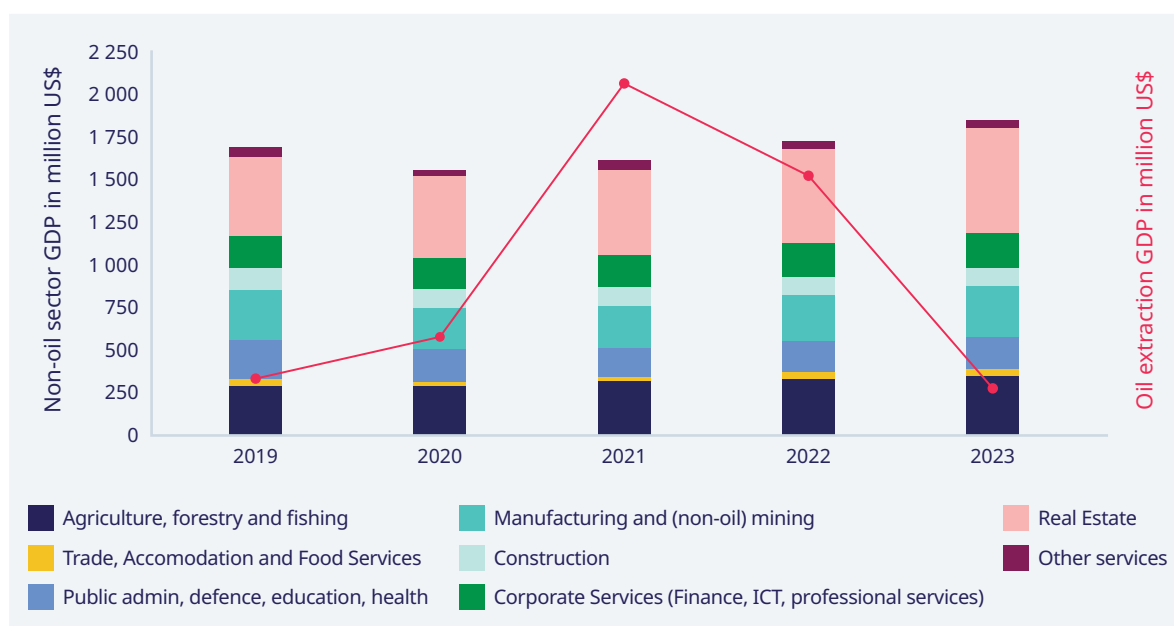
Indicator	Data	Year
GDP and GDP per capita (at US\$ current price)	1.08 billion and 1,502.50	2023
GDP growth: total and non-oil	18.1% and 2.4%	2023
GDP per capita growth: total and non-oil	19% and 1.3%	2023
Value-added contribution by sectors: (total and non-oil) ¹³		2023
▶ Agriculture	16.6% and 19.08%	
▶ Industry	23.45%* and 12.01%	
▶ Services	59.95% and 68.91%	
Personal remittances, received (% of GDP)	9.3%	2023
Risk of external debt distress	Moderate	2024

Note: *The oil production in 2023 decreased significantly (see figure 5).

Source: World Bank (n.d), IMF (2024), INETL (2024b).

Noteworthy economic diversification has yet to appear. Excluding the oil sector, the main economic activities contributing to national output are public administration, agriculture, retail, real estate and construction (see figure 5). However, public administration and construction are driven by government spending. When interviewed for this study, Chamber of Commerce and Industry representatives referred to a previous assessment (USDS 2024) that indicated many private companies are dependent on government contracts not only for profitability but for survival. Consequently, size, effectiveness and quality of government spending considerably influence the growth potential.

► Figure 5. GDP contribution, by sector: oil and non-oil, 2019–23



13 The sectoral contribution to growth is based on national account data, available from the National Institute of Statistics (2024) on value added at factor cost.

► Figure 5. (cont.)

GDP in million US\$	2019	2020	2021	2022	2023
GDP (factoring statistical discrepancy)	2.033	2.163	3.625	3.209	2.080
<i>Oil sector</i>	344	581	2.062	1.533	278
<i>Non oil sector</i>	1.688	1.581	1.563	1.676	1.802

Note: The sectoral aggregation level followed the National Institute of Statistics' broad sector classification for the 2024 study on agricultural GDP and trends.

Source: Based on [INETL 2024a, dataset](#).

The limited extent of the national production is reflected in the substantial contribution of private consumption to GDP by expenditure type and of import reliance.¹⁴ In 2023, private consumption represented 63.8 per cent of domestic expenditures, largely enabled by government payments, such as civil service wages and social transfers ([World Bank 2024c, 5](#)), and by personal remittances, which have steadily increased over the years, at an average growth of around 30 per cent since 2020 (see table 3) as a result of increased labour migration (see section 3.3). At the other end, the trade deficit remains high, with mostly imported merchandise goods meeting domestic demand for both consumption and investment, including food ([World Bank 2024c, 4](#)). This situation makes Timor-Leste susceptible to inflation from commodity price volatility and geopolitical dynamics.

The absence of an enabling environment for doing business has created a non-ideal atmosphere for private sector development. A World Bank enterprise survey highlighted political instability, limited access to finance and high electrical costs as major business constraints ([World Bank 2021b, 10](#)). The 2024 US Investment Climate Statements similarly identified inadequate regulatory mechanisms, corruption, insufficient personnel capacity and deficient infrastructure as the main factors hindering investment ([USDS 2024](#)). Land tenure regulations further elevate the investment risks, thus deterring private investors ([Novak 2023](#)), as confirmed by the Chamber of Commerce and Industry and SEFOPE representatives when interviewed for this study.

Limited effectiveness in policy planning and implementation are also perceived as issues for economic diversification. Despite the considerable increase in public spending over the past decade, the private sector remains underdeveloped.¹⁵ The country's [Strategic Development Plan 2011–2030](#) highlights agriculture, petroleum and tourism as priority industries, supported by rural development, private sector investment and infrastructure. Aligned with the policy directive, TradeInvest Timor-Leste sees agriculture, fisheries, tourism and the processing industry, especially for food production, construction materials and small-scale manufacturing, as well as infrastructure as sectors with profitable investment opportunities ([TITL, n.d.](#)). Nevertheless, oil and gas remains a sector with the most foreign direct investment ([USDS 2024](#)), and its production and processing is prioritized regardless of the global trend of decarbonization. The Greater Sunrise oil field development is a national priority,¹⁶ supported with significant resources and budgetary

14 By mid-2024, the current account deficit reached US\$62.1 million, or 8.6 per cent of GDP ([World Bank 2025a, 10](#)).

15 All informants interviewed for this study emphasized the need to critically re-evaluate the contribution of subsidies and the State budget allocation to economic diversification.

16 The Greater Sunrise oil field development is planned under the Tasi Mane Project, which involves constructing a 150-kilometre maritime gas pipeline, a new port, an LNG plant to process 5 trillion cubic feet of gas and a highway, with an estimated cost of US\$8–\$12 billion. The development is delivered by Sunrise Joint Venture, which comprises TIMOR GAP, an oil and gas State-owned enterprise (at 56.6 per cent), Woodside Australia (at 33.4 per cent) and Osaka Gas Australia (at 10 per cent). TIMOR GAP is mandated to manage and administer the Tasi Mane Project (see Chapter 4.3. of the Program of the IX Constitutional Government).

allocation under the Government's Tasi Mane Project, which is expected to create 10,000 direct jobs and 50,000 indirect jobs and boost both GDP and exports.

Agriculture, including forestry, livestock and fisheries, is a crucial policy target for economic diversification but remains underdeveloped, featuring low productivity and dominated by subsistence farming. The coffee industry, which is the largest single non-oil export contributor,¹⁷ is characterized as having low and volatile productivity, suboptimum quality and poor management (MALFF 2019, 20–23), which are credited with having reduced its GDP contribution between 2010 and 2020 (INETL 2024a, 11–12) and its export value.¹⁸ In general, crops (including rice, corn and vegetables), which contribute 70 per cent of the agricultural GDP, have had significant output decline since 2016 (INETL 2024a, 11). Together with rising demand due to population growth, such a situation has led to import dependency for food products (WFP and GDRTL 2023, 24).¹⁹

Livestock, whose output grew sevenfold between 2010 and 2020, still contributes less than 25 per cent of the agricultural GDP (INETL 2024a, 8). Forestry and fisheries accounted for only 3.4 and 2.3 per cent, respectively, of agricultural GDP in 2021, despite various assessments of the potential benefits and positive livelihood impact from the sector in building economic resilience and inclusion in rural areas (see for example, Iyengar 2024; Ludher and Woo 2024; Australian Aid 2023). In trying to optimize the sector, the Government launched a blue economy policy, focusing on oceanic economy development, which encompasses fisheries and aquaculture, mangrove reforestation and coastal and marine tourism (Iyengar 2024).

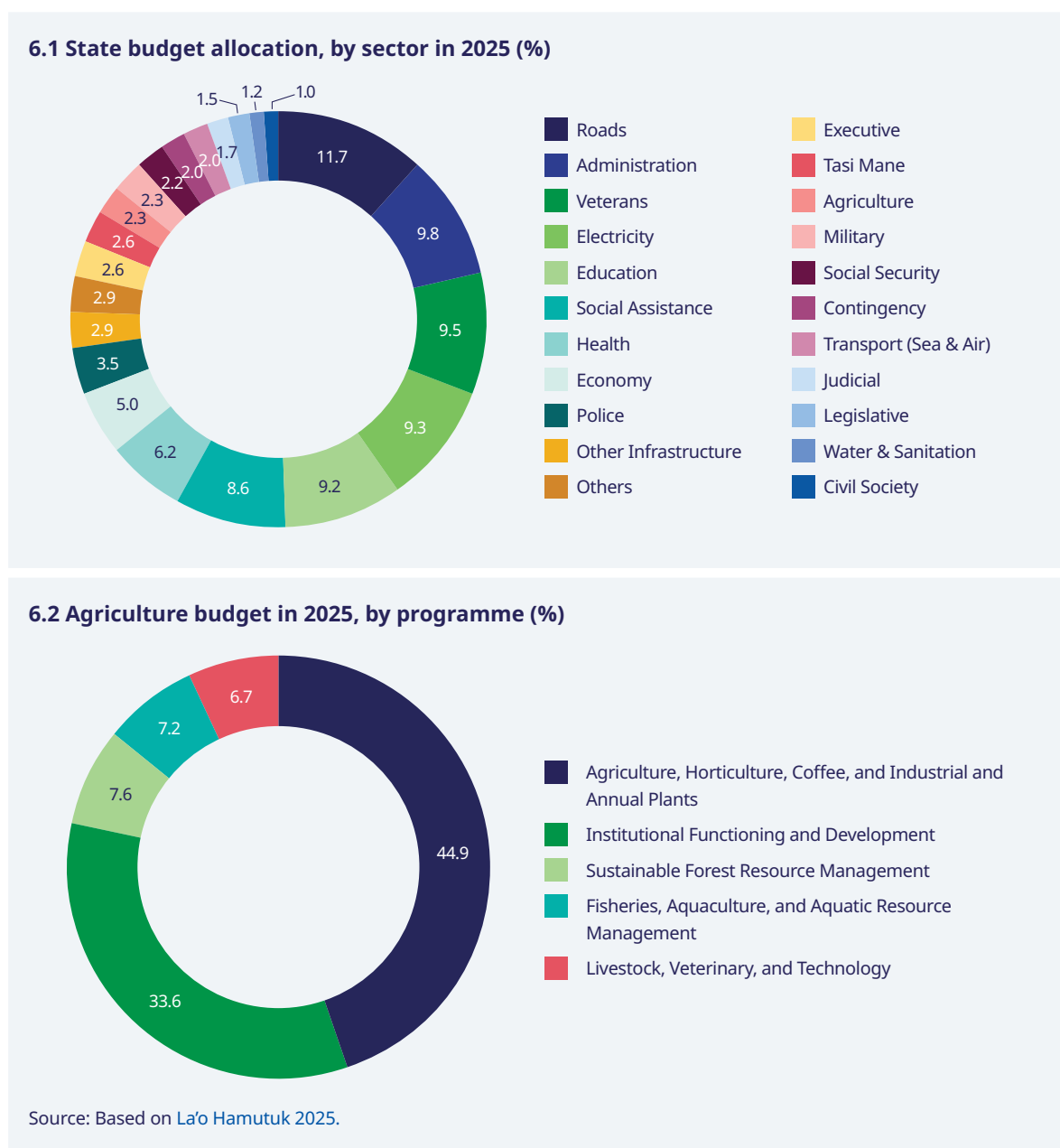
The importance of agriculture for the economy was reaffirmed by the informants interviewed for this study. Representatives from trade unions and a civil society organization working on environmental issues, inclusion and support to people with disabilities, highlighted the sector's potential in providing livelihoods for vulnerable groups. The interviewed representatives from government agencies also stressed the sector's importance within government directives and interventions. Previous TradeInvest survey findings indicated that investors are attracted to agriculture and targeting export markets and domestic demand growth, especially in urban areas (TITL 2024, 8). And yet, the investment realization and budget allocation do not reflect this emphasis, with the sector being supported by a total of US\$40.8 million within the 2025 budget via various programmes and ministries (see the right side image in figure 6). This allocation is equal to 2.3 per cent of the total budget – smaller than the Tasi Mane Project, which receives 2.6 per cent budget allocation (see the left side image in figure 6).

17 In 2022, Timor-Leste exported US\$138 million in coffee, making it the 33rd-largest exporter of coffee in the world; coffee was the second-largest exported product in Timor-Leste, after oil.

18 "Timor-Leste's coffee industry struggles with low productivity and quality issues. A major concern is low farm yields, which average less than 200 kilograms of green beans per hectare, well below the global average of 880 kilograms (World Bank 2025a, 24).

19 Food imports constituted 28 per cent of merchandise imports in 2022, decreasing from the previous two years, at more than 30 per cent (World Bank, n.d.).

► Figure 6. State budget allocation for the agriculture sector, 2025



Another often-cited sector with growth potential is tourism, which would rely on the country's natural and cultural endowments. However, the sector remains in a nascent stage. Signs of progress were evident prior to 2020, but the COVID-19 pandemic impact curtailed that progress (Lopes 2023, 24; Novak 2023). Commonly identified barriers to development of the sector include insufficient infrastructure (such as entry ports, roads and hotel facilities), a shortage of skilled labour and a lack of niche market-oriented promotion (World Bank 2024c, 14; Lopes 2023, 24; Novak 2023). To recover from the pandemic and maximize the sector's potential, the Government is promoting niche areas aligned with the blue economy concept, such as ecotourism and religious and cultural tourism.

Timor-Leste is enhancing its regional and economic integration to support its development strategy. In 2024, it became a member of the World Trade Organization. As part of that accession process, the Government signed bilateral trade agreements with important trade partners, such as the [European Union](#), [Australia](#) and the [United States](#). In addition, an “in-principle” agreement for Timor-Leste’s Association of Southeast Asian Nations membership was announced during the [24th ASEAN Leaders Summit in 2022](#), with full membership expected in 2025 ([Kun 2025](#)). Such integration is intended to accelerate economic diversification by improving governance, international trade and foreign direct investment, paired with reforms in domestic governance and the business environment.

The lack of diversification also makes Timor-Leste’s economy highly susceptible to additional shocks from the climate risks. The combination of the country’s vulnerability to natural and climate hazards, the reliance on imported goods, the limited domestic production and a fiscal space highly dependent on the Petroleum Fund leaves future prospects uncertain, as highlighted by the summary indicators in table 4.

► **Table 4. Selected economic vulnerability indicators of the Economic and Environmental Vulnerability Index, 2024**

Indicators	Statistical value (0-100)	Index* (0-100)
Share of agriculture, forestry and fishing in GDP	10.7	16.4
Merchandise export concentration	7.6	60.6
Instability of agricultural production	5.3	20.6
Instability of exports of goods and services	57.0	100.0

Note: A higher index number represents higher vulnerability.

Source: [UN Department of Economic and Social Affairs, 2024](#).

3.3 Labour market context

The most recent [Labour Force Survey](#) findings (2021)²⁰ indicate that the country has low labour force participation, at 30.5 per cent, even though 62.9 per cent of the population is of working age (see table 5 for selected indicators). This rate is relatively lower than in other South-East Asian countries and other Small Island Developing States.²¹ The unemployment rate is 5.1 per cent, with higher rates persisting for vulnerable groups, including women, youths and people with disabilities. The relatively low unemployment rate is driven by lack of job prospects prompting most of the population to opt out from the labour force rather than actively seek work ([INETL 2024d, 2](#)). The employment-to-population rate was 46 per cent in 2021.

Women are more likely to be outside the labour force and less likely to be employed and earn less than their male counterparts when they are working (see table 5). More than half of all working-age women are not working due to family duties, a practice influenced by social norms at an early age and which has

20 More recent data, consistent with the Labour Force Survey findings although slightly different, are available at [INETLd](#).

21 For a comparison, within the same period, labour force participation in Cambodia and Myanmar (low-income countries) were 77.2 per cent and 52.6 per cent, respectively. The Philippines has the lowest participation rate among ASEAN Member States, at nearly 50.9 per cent, due to low female participation ([ASEAN Secretariat 2023, 50](#)). Among the Small Island Developing States, the Pacific countries had relatively higher rates, such as Solomon Islands (at 84 per cent), Samoa (at 45 per cent), Fiji (at 57 per cent) and Papua New Guinea (at 51 per cent). The Caribbean countries also showed relatively higher rates, such as the Bahamas (at 70 per cent), Cuba (at 52 per cent) and Guyana (at 51 per cent) ([World Bank Database](#). Accessed 10 February 2025).

also resulted in lower educational attainment with respect to their male counterparts across all levels of education (Robbins 2024). The study interviews with the trade union representatives confirmed the ongoing unequal treatment in the workplace despite recent progress, such as the introduction of paid maternity and paternity leave.

In 2021, youth unemployment rate was 9.6 per cent (12.6 per cent for women and 7.4 per cent for men); and 30.5 per cent of them were not in employment, education or training (NEET). The 2022 Population and Housing Census findings seems to indicate a rise in child and youth labour, with children in rural areas especially starting to work at a young age.²² And among the working youths, 58.9 per cent were in vulnerable employment, with higher vulnerability observed in the younger and female groups (INETL 2024c, 70–71).

The 20–24 age group has the largest unemployment prevalence among all age groups, particularly for women (INETL 2024c, 75–76).

The previously described situations are typically a push factor behind the rural-to-urban migration among youths.²³ But the most recent household census (2021) found a large concentration of the youth population and unemployment in urban areas, including Dili, Ainaro and Ermera (INETL 2024c, 76).

As for international labour migration, a study of the seasonal workers programmes found that Timor-Leste's oversupply of young and educated individuals who are frustrated by the lack of job opportunities, which is leading them to seek participation in the programme (Rose 2022). This finding is consistent with what representatives from the trade unions, government agencies and the Chamber of Commerce and Industry described when highlighting the trend of youths seeking jobs abroad, especially through the bilateral mobility partnerships programme.

Barriers to employment are huge for people with disabilities, who were represented by an unemployment rate of 19.6 per cent in 2021. However, women with a disability have a lower rate than their male counterparts (at 3.1 per cent, compared with 27.8 per cent), which is likely due to lower female participation in the labour market in general. Interviewed informants pointed out several contributing factors, including workplace discrimination, the physical barriers to workplaces and educational recognition barriers – with people with disabilities needing to go to Indonesia for an equivalency exam. The interviewed informants signalled that the situation is even more challenging for the LGBTQIA+ community, who experience various forms of discrimination and limited job access but who are not captured by the census questionnaire.

Thus, despite a considerable portion of the population of productive age, they remain underutilized. In 2021, the composite labour underutilization rate reached 28.9 per cent (33.3 per cent for women and 25.8 per cent of men), indicating that a significant portion of the working-age population is unemployed, underemployed or not fully engaged in the labour market (INETL and ILO 2022, 30–31).

22 According to the Population and Housing Census 2022 findings, 5 per cent of children (equal between sexes) aged 10–14 years were actively engaged in work, and 6.6 per cent of children aged 10–17 who were working, mainly boys from rural areas, were in economic activities, which indicates a significant child labour risk (INETL 2024c, 69, 72).

23 Education and job search are the main reasons for migration among population aged 20–24 (INETL 2024d, 54).

► Table 5. Summary labour market indicators, 2021

Indicators	Male	Female	Total
Working-age population (000s)	403.6	405.8	809.3
Labour force (000s)	148.9	98.1	247.0
Subsistence production as main work (000s)	166.4	273.4	439.8
Labour force participation rate	36.9	24.2	30.5
► Rural	34.9	23.6	29.3
► Urban	40.0	25.1	32.4
Unemployment rate	4.6	5.9	5.1
► Youths (aged 15–24)	7.4	12.4	9.6
► Persons with disabilities	27.8	3.1	19.6
► Rural residents	2.3	1.8	7.0
► Urban residents	0.8	0.9	2.6
Employment by broad sector (%)			
► Agriculture, forestry and fisheries	24.2	31.0	26.9
► Industry	16.5	8.7	13.5
► Services	59.0	59.3	59.1
► Unclassified	0.3	1.0	0.5
% of manufacturing employment	5.3	8.4	6.5
Informal employment (%)	75.3	80.4	77.3
► Agriculture, forestry and fisheries			95.3
► Industry			90.6
► Services			66.0
Labour underutilization rate (%)	25.8	33.3	28.9
Average monthly wage (US\$)	252	236	248

Source: Timor-Leste Labour Force Survey 2021, INETL and ILO 2022.

The agriculture sector continues to be a significant employer but with an alarming decline, while the services (trade) and public sectors indicate increasing trends (see 7.1 in figure 7). Aligned with economic development, job creation in the past decade concentrated in public administration, particularly public sector employment. Outside of this, most of the employment is vulnerable in nature, with a high informal employment rate, at 77.3 per cent. Between 2013 and 2022, the services and industry sectors experienced a decrease in labour productivity, with the increase in value added not keeping pace with employment (World Bank 2024c, 6). And the sectors employing two thirds of the workforce (including agriculture, wholesale or retail, manufacturing and construction) had a lower-than-average labour productivity, with agriculture showing the lowest among the values (see 7.2 in figure 7).

An investment monitoring evaluation from TradeInvest (TITL 2024) revealed that between 2016 and 2024, investment concentrated in the capital-intensive sectors, such as finance, industry (especially food and beverage manufacturing) and tourism, leading to relatively higher direct job creation over the years (see 7.3 in figure 7). While tourism is generally labour-intensive, the number of jobs per dollar invested was still the lowest, when compared with other sectors. This situation possibly stems from the fact that investments are still at an early stage, thus requiring relatively higher capital expenditure. Nevertheless, the capital invested signals a long-term commitment and future employment prospect. Conversely, other labour-intensive sectors, such as agriculture, livestock and infrastructure, have only secured small investment, limiting the job creation impact.

► **Figure 7. Employment creation and labour productivity, by economic activity, 2013–22**

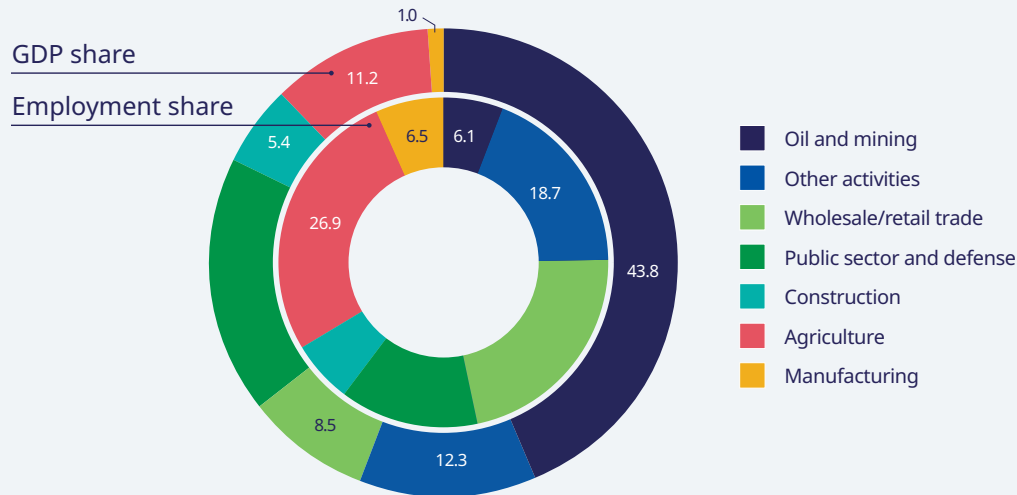
7.1 Employment, by economic activity (aggregate)

Aggregate sector	2013		2015		2016		2017		2018	
	Workers	%	Workers	%	Workers	%	Workers	%	Workers	%
Agriculture	24 7875	67.95	223 961	58.61	214 297	46.26	103 566	37.84	169 857	42.24
Manufacturing	12 886	3.53	5 695	1.49	33 345	7.20	15 219	5.56	6 202	1.54
Construction	11 658	3.20	—	—	—	—	14 379	5.25	7 530	1.87
Mining and quarrying; Electricity, gas and water supply	2 028	0.56	4 232	1.11	5 648	1.22	1 934	0.71	0.842	0.21
Trade, transportation, accommodation and food and business and administrative services	57 925	15.89	94 064	24.62	165 633	35.77	78 264	28.60	110 797	27.56
Public administration, community, social and other services and activities	32 036	8.78	53 118	13.90	42 030	9.08	60 307	22.04	56 647	14.10
Not classified	0.360	0.10	1 047	0.27	1 871	0.40	—	—	50 211	12.49
Total	364 768	100.0	382 117	100.0	463 249	100.0	273 669	100.0	402 086	100.0

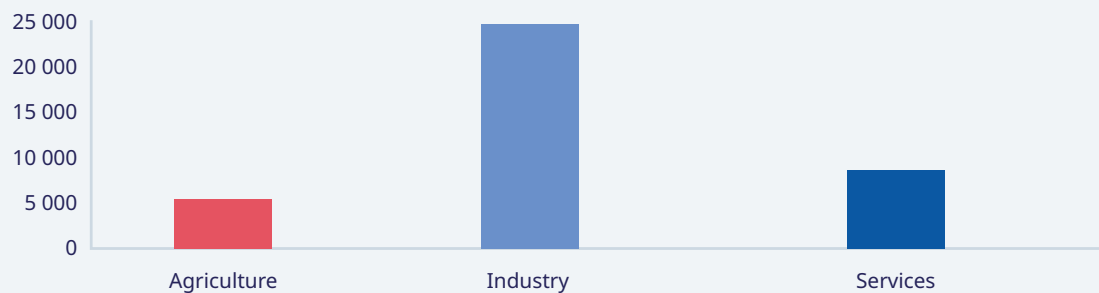
Note: For the longitudinal analysis, the data derived from ILOSTAT processing on microdata from national surveys, classified by aggregate economic activity. The 2013, 2016 and 2021 numbers are based on the Labour Force Surveys, while the 2015 and 2022 numbers are based on the Population and Housing Census findings.

7.2 Labour productivity, by sector

Employment and real GDP share (in percent, 2021)



Labour productivity (in US dollar per person/year, 2022)



Source: National Institute Of Statistics Timor-Leste.

Note: The number of employers is based on 2021 Labor Force Survey.

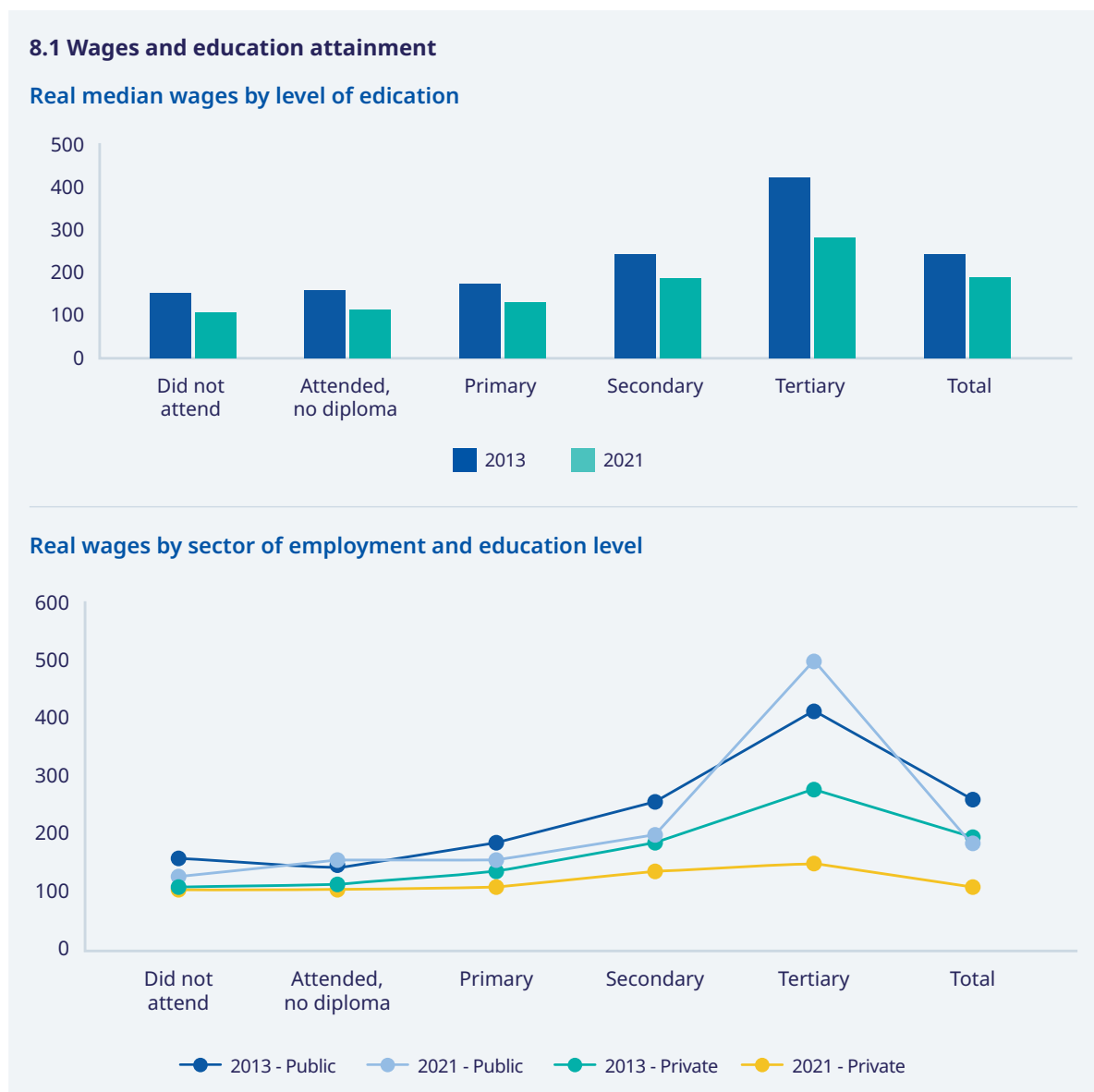
7.3 Number of new investment and job creation, 2016–24

Sector	Investment	Enterprise	Job	Job/\$ invested
Agriculture	50.000	4	50	0,100%
Livestock	929.791	6	188	0,020%
Industry	12.685.840	9	476	0,004%
Infrastructure	232.663	1	228	0,098%
Tourism	20.716.024	7	301	0,001%
Finance	8.816.741	2	506	0,006%
Health	293.456	1	42	0,014%

Source: 7.1: ILOSTAT. Accessed 10 February 2025; 7.2: IMF 2024, 22; 7.3 TITL 2024, 19.

Skill gaps and mismatch are another frequently cited factor contributing to low labour force participation (World Bank 2024b, 8). The Population and Housing Census 2022 data (INETL 2024d, 4) indicate that more than half of the working-age population has only a primary school education, while just 2.2 per cent have attained higher education, irrespective of their sex. Educational attainment correlates positively to earned wages, as seen in graph 8.1 of figure 8. But when comparing real wages data over time, there appears to be a declining trend for workers with a high level of education, particularly among persons in the private sector. This suggests a diminishing return to higher education. Overall, the combination of low-quality job creation, falling real wages and diminishing return to education discourages workers, particularly youths, from joining the workforce (World Bank 2024b, 8).

► **Figure 8. Declining wages trend, 2013 and 2021**



8.2. Wages gap in formal and informal sectors

Real median wages by gender and formality



Source: World Bank 2024c.

Marked geographical differences emerged in the 2021 Labour Force Survey findings. In rural areas, where 61.7 per cent of the population and 63.1 per cent of the working-age population lived at that time, 72.8 per cent of the population was either unemployed or out of the labour force (INETL and ILO 2022, 11). Compared with their urban peers, the rural population was also more likely to have subsistence production work as their main job (61.2 per cent compared with 43.9 per cent).²⁴

The rural–urban divide is also significant in educational attainment, with 64.9 per cent of the rural working-age population in 2021 having finished, at most, their primary school education, with as little as 1.4 per cent of the population having a higher education (compared with 31 per cent and 4.2 per cent, respectively, in urban areas). With economic development and jobs concentrated in urban areas, especially in Dili, many rural individuals, especially within the 25–34 age group, are migrating to the cities (INETL 2024e, vi). According to the interviewed representatives from trade unions, SEFOPE and the Chamber of Commerce and Industry, this dynamic is contributing to the reduction of agriculture productivity.

According to an International Office for Migration (IOM) report, based on a 2019 survey, 48 per cent of migration (be it internal or international) in Timor-Leste at that time was employment-motivated (IOM 2023b, 6). Such factors as lack of job opportunities, declining agricultural livelihoods, poor infrastructure and underdevelopment were cited as migration drivers (IOM 2023a, 2). Most migrants are working-age men, with women are more likely to engage in domestic care work (IOM 2023b, 6). Internal migration follows a rural-to-urban mobility stream, with the urban centres of Dili and Bacau the primary destinations (IOM 2023b, 47). But with limited employment opportunities in those urban centres, many migrants turn to the informal economy or favour migrating again to another urban area or to another country rather than returning to their rural origin (IOM 2023b, 50). Nearly 40,000 Timorese were registered as migrants in 2020, with government estimates suggesting the figure may be closer to 50,000 (IOM 2023b, 22). Employment is the main reason for foreign migration, with more than half of migrants citing job opportunities abroad as their reason for leaving (IOM 2023b, 27). Timorese who were born before independence are entitled to a Portuguese passport, which is used to find employment in European countries and in the United Kingdom (IOM 2023b, 28). The Government has been expanding labour mobility partnerships with more developed countries to facilitate labour external migration for Timorese (IOM 2023b, 29).

²⁴ The number of individuals depending on subsistence production exceeded half the working-age population in 2022, with the proportions greater for women and young people, at 62.2 per cent and 66.1 per cent, respectively (INETL and ILO 2022, 5).

With the limited job creation in the country, the Government is building up partnerships with developed countries for seasonal labour mobility schemes, including with [Australia](#) and the [Republic of Korea](#). Agriculture, aquaculture, fisheries, tourism, hospitality, aged care and construction are targeted sectors.

A considerable number of migrants send remittances home, and many families have become dependent on these funds due to the limited job opportunities and decreasing livelihoods ([IOM 2023b](#), 62, 71, 108). The international remittance inflow has been stable and increasing since 2013, making it the second-largest non-oil GDP contributor in 2023 ([World Bank 2024c](#), 24). However, most funds are spent on consumption rather than productive activities, hence, providing minimal developmental impact.

Although migration is expected to increase skill acquisition through education and work experience, potentially boosting productivity upon a worker's return, many returned migrants encounter difficulties finding suitable long-term employment despite their acquired skills ([Flinders University 2024](#)).

With the existing structural challenges for economic development and the deteriorating labour market environment, the increasing climate risks will create more pressure, especially for the most vulnerable groups. By sector, the physical climate risks threaten agriculture, livestock and fisheries and the associated employment, as reflected in the declining trends in employment size and labour productivity. The climate transition risks may affect the oil and mining sector, which although still small, offers opportunity for employment and importantly affects the overall economy. Aligning employment creation considerations and just transition principles with development planning and environmental policies and programmes is going to be critical to mitigate the negative employment impact from climate change.

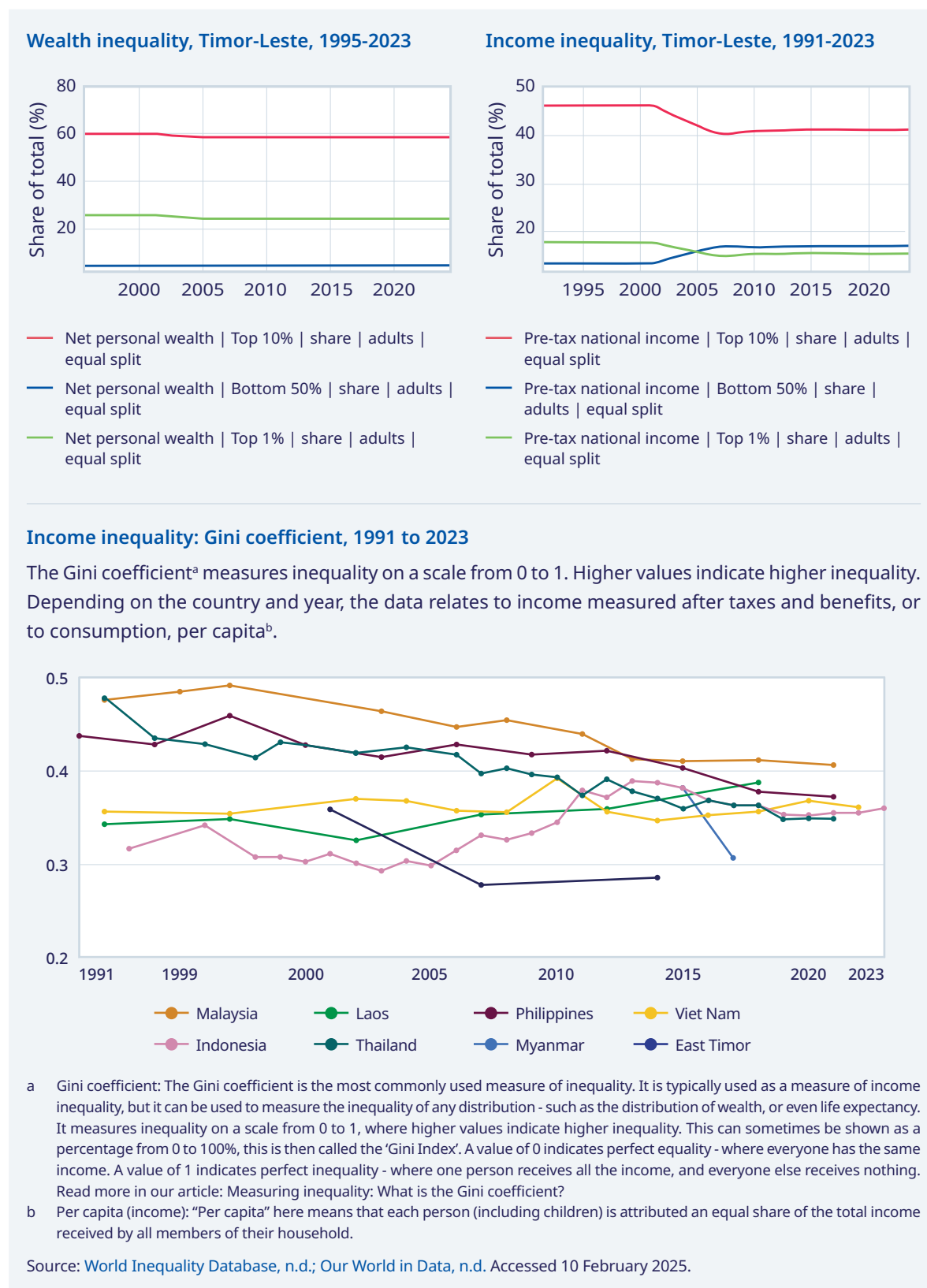
3.4 Poverty and inequality contexts

The latest-available data indicated that 24.4 per cent of Timorese lived on less than \$2.15 per day, and 41.8 per cent of population lived under the national poverty line (World Bank 2014). Additionally, the United Nations Development Programme estimated in 2023, based on 2016 data, that 45.9 per cent of the population had experienced multidimensional poverty and 45.6 per cent was deprived of clean cooking ([UNDP and OPHDI 2023](#), 26).

Food insecurity and malnutrition remain the most pressing challenges. A recent World Food Programme report ([WFP 2024](#), 9) warned that a deteriorating situation persists, with 42 per cent of households (about 569,000 people, or more than a third of population) facing different levels of food insecurity. This vulnerability is taking its toll, with 47 per cent of children younger than 5 years at risk or experiencing stunting due to malnutrition. This particular situation has negative impact on children's development and thus on the country's future prospects ([UN 2023](#), 12).

The latest Gini index measure of wealth or income inequality is also from 2015 giving Timor-Leste a value of 28.7. Although this is relatively low, especially when compared with South-East Asian neighbours, it represents a slight increase from the 2007 value, which was 27.8. A side-by-side comparison of wealth and income share reveals that the bottom 50 per cent of the population had less than 5 per cent of wealth and earned 16.7 per cent of national income in 2023 (see figure 9).

► Figure 9. Wealth and income inequality, 1991–2023



Inequality is also reflected in the urban–rural divide, with the poverty headcount soaring, at 47 per cent, in rural areas, compared to 28 per cent in urban areas (World Bank 2023a, 1).

Most rural households depend on subsistence farming, are deprived of adequate infrastructure and government services and are prone to climate-related physical risks (UN 2023, 13, 17, 19). Although the economy has been benefiting from increasing government spending over the past decade, particularly for infrastructure development, such spending concentrates in urban areas, thus deepening the rural–urban inequalities (Scheiner 2022, 6, 15).

Although Timor-Leste has one of the highest levels of public expenditure on social protection per capita, the effective coverage is low.²⁵ In 2023, the coverage rate reached 23.6 per cent, far below the average of lower-middle-income countries (at 32.4 per cent) and of South-East Asian and Pacific countries (at 47.6 per cent). Social protection expenditure in 2023 amounted to 17.6 per cent of total public expenditure (ILO 2024d, 69). Social protection expenditure is increasing, with the Timor-Leste Institute for Development Monitoring's budget monitoring data showing that the allocation for social protection programmes increased in nominal value and in relative share of the State budget between 2023 and 2025 (see figure 10).

The country has a national health service system that provides free or affordable health care (ILO 2021, 8), although the low utilization rate points to lack of infrastructure and thus lack of access to services, especially among rural communities (World Bank 2023a, 27).

The Government provides various regular and emergency social assistance programmes and social security support targeting poor and vulnerable households, children, pensioners, people with disabilities and people affected by disasters, health crises (such as the COVID-19 pandemic) and domestic violence.²⁶ The Government introduced a social security contribution programme for workers in 2016, but it currently represents only 28 per cent of total non-health social protection contributions, indicating a need for improvement (ILO 2024a, 5). Nevertheless, the increase in social protection expenditure is associated with an increase of coverage in almost all population groups, although the government allocation for vulnerable persons and children aged up to 15 years decreased (see figure 10).

In its latest social protection review, the World Bank estimated that over the past decade and excluding the veteran pension, which amounts to around 66 per cent of expenditures, overall social protection expenditures accounted for 3 per cent of non-oil GDP (World Bank 2025b, 18). However, this generous spending has yet to result in significant poverty reduction.²⁷

25 Measured by share of population that is covered by at least one social protection benefit.

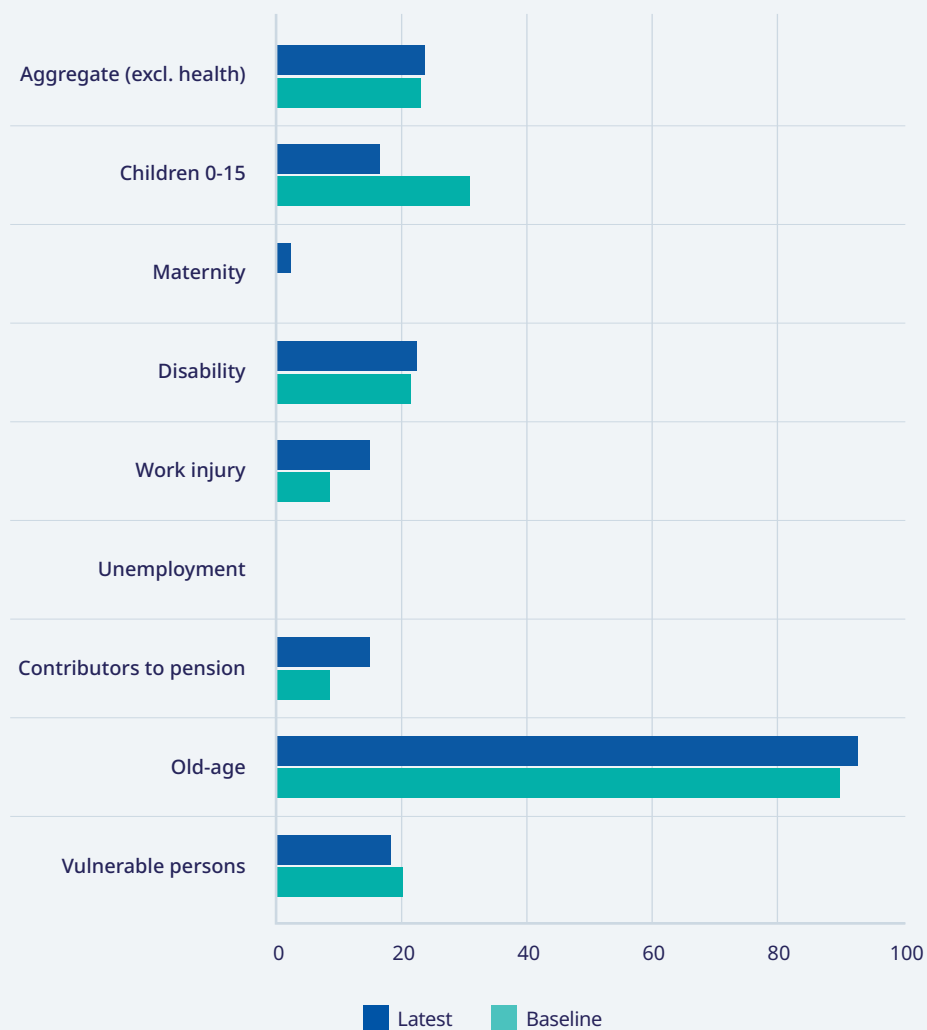
26 See World Bank 2023, 19–21 for a list of ongoing social protection programmes.

27 The World Bank attributed this shortcoming to ineffective targeting and low spending for poverty-targeted groups. For example, the now-dismissed Bolsa de Mae cash transfer scheme was the only poverty-targeted programme in the review, but an estimated 47 per cent of the beneficiaries were non-poor. Additionally, the delivery system is characterized as fragmented, with each programme operating its own system (World Bank 2025b, 14).

► **Figure 10. Allocation of State budget for social protection programmes and coverage, by function, 2023–25**

Year	Social Protection	State budget
2025 P	343.4	2 125.2
	16.16%	100%
2024 B	286.5	1 890
	15.16%	100%
2023 R	254.8	1 960
	13.00%	100%

SDG 1.3.1 effective coverage by function (% of population group)



Source: Calculated based on TLIDM 2025; [ILO World Social Protection Data Dashboard](#). Accessed 9 June 2025.

3.5 Review of the national policy landscape of the climate–economy–employment nexus

Timor-Leste has been actively engaged in climate diplomacy, ratifying the United Nations Framework Convention on Climate Change (UNFCCC) in 2006, the Kyoto Protocol in 2008 and the Paris Agreement in 2016. Since 2009 and represented by the Climate Change Ambassador of the Ministry of Foreign Affairs and Cooperation, the country has served as the coordinator for the loss and damage negotiations for least developed countries in the UNFCCC process. Timor-Leste also represents the least developed countries on the Executive Committee for the Warsaw International Mechanism for Loss and Damage and the Asia-Pacific countries in the Least Developed Countries Expert Group, under the UNFCCC and the Paris Agreement.

Consistent with the country's environment and socio-economic contexts, Timor-Leste has focused on adaptation and resilience-building while supporting international climate cooperation. The interviews with representatives from the Ministry of Foreign Affairs and Cooperation and the NDCC for this study revealed that much of the Government's efforts and resources are concentrated on climate justice advocacy, especially to pressure more developed countries to commit to their climate pledges and to assist and mobilize resources to support Timor-Leste's adaptation and mitigation efforts. The prioritization of climate adaptation elements is reflected in the government programmes and budget allocations (see the Chapter 4 section on climate finance). Due to the country's low contribution to global emissions, the relatively low perception of climate vulnerability and the scarce resources, mitigation (actions to reduce or prevent greenhouse gas emissions) and low-carbon transition policies are the least prioritized. In fact, the Government's development policy priority remains with oil and gas, as pointed out in the [Prime Minister's inaugural speech](#) in 2023.

Timor-Leste has several policies and programmatic instruments on climate change for adhering to UNFCCC requirements. In 2011, Timor-Leste formalized its National Adaptation Programme of Action (NAPA), which identified urgent adaptation needs. The Initial National Communication was submitted to the UNFCCC in 2014, followed by the first Nationally Determined Contributions (NDC) submission in 2017. These two submissions were updated in 2020 and 2022, respectively, and complemented by a National Adaptation Plan in 2021.

Timor-Leste has progressed in strengthening its regulations on environmental protection and climate change. In 2012, the Environment Basic Law was stipulated under Decree Law 26/2012, thus providing a legal framework for environmental protection and conservation, including the establishment of an environmental licencing system that requires impact assessments for public and private projects that produce environmental and social impacts (articles 2 and 4). It also recognizes customary environmental management practices, or Tara Bandu (articles 15 and 16).

The NDCC was also established in 2017 under the Secretariat of State for Environment to help coordinate environmental policies. The NDCC led the development of the National Climate Change Policy, as stipulated under Government Resolution No. 8 of 2022. The Climate Change Policy provides the legal foundation for policy and programme implementation relevant to climate change and in alignment with the country's international commitments (see the following box). The Government is now in the process (as of second quarter 2025) of approving the Climate Change Base Law.²⁸

²⁸ The [current draft](#) comprises ten chapters and 52 articles and includes provisions on: general principles; climate rights and duties; climate governance mitigation; adaptation; emissions monitoring, reporting and verification; climate finance; sectoral provisions; enforcement; and transitional.

Although the Government has started implementing its whole-government approach²⁹ for climate-related policies and programmes, the links with employment elements are not fully clear or direct. For instance, while the Climate Change Policy looks at employment-generating activities, such as those linked to mitigation and adaptation plans or, more broadly, to economic diversification, the action plan to foster private sector development, prepare the workforce or identify recruitment needs has minimal attention to the Climate Change Policy. The Climate Change Policy document acknowledges the need for ensuring a just transition in its “economic diversification” section,³⁰ but there is no further elaboration on how these principles will be mainstreamed. Nor are there measures related to mitigating the employment impact.³¹ Additionally, the Climate Change Policy does not prescribe any role for SEFOPE within its Annex I on ministerial responsibilities.

► **Timor-Leste Climate Change Policy, Government Resolution 8/2022**

The country's National Climate Change Policy consolidates relevant government regulations. The policy was developed through an inter-ministerial consultation process to identify, evaluate and prioritize the Government's efforts for effective implementation, under the coordination of the National Directorate of Climate Change. It aligns with the country's climate commitments, as formalized within the Nationally Determined Contributions, the National Adaptation Programme of Action, the National Adaptation Plan and the National Communication to the United Nations Framework Convention on Climate Change. The interventions are clustered based on prioritized economic sectors and cross-cutting policy elements, as follows.

- **Agriculture (food crops and livestock).** The identified climate-related risks are temperature increase, rain variability, sea-level rise and increased extreme weather events. Adaptation policy includes crop management systems, use of climate-resilient species or seeds, crop diversification, improved supportive system (including early warning, research and innovation) and improved planning and regulation. Permanent and smart agricultural practices are prioritized for mitigation purposes.
- **Energy (commercial and private).** The policy covers mitigation policy for the sector, focused on developing and utilizing renewable energy technologies and implementing energy efficiency measures for buildings, industrial use and vehicles. Additionally, it prescribes regulation requiring companies to establish emission mitigation plans for mining and petroleum activities.

(cont. on the next page)

29 The whole-of-government approach asks for a coordinated and integrated approach to climate change policymaking and implementation across different ministries and government agencies.

30 All interventions must follow the principles of just transition and be determined through stakeholder engagement process to ensure sustainable development and poverty reduction. See section IV of the Government Regulation.

31 A similar pattern is found in the draft of the Climate Change Base Law. Although the draft was developed to provide an encompassing legal framework for climate change programme implementation, little linkage is provided on employment impacts or the just transition principles (although, climate justice, economic and regulation integration and sustainable development are included as underlying principles). Employment stakeholders, excluding business associations, were not included as part of the climate change-related institutional setting under different provisions. The limited links between the environment and labour market elements exist despite the explicit reference to the Strategic Development Plan as one of the guiding policies to draft the base law.

- ▶ **Fishing and aquaculture (coastal and marine ecosystem).** Change in precipitation, change in depth and composition of sea water, temperature increase and increased extreme weather events are climatic risks for the sector. The suggested adaptation policies focus on increasing adaptive capacity, improving marine and coastal protection and conservation and reducing vulnerability while supporting alternative employment and livelihoods for coastal communities, including through aquaculture development, mangrove rehabilitation and ecotourism.
- ▶ **Forestry and other land use.** Associated climatic risks include increased temperatures and precipitation. The mitigation priority is on carbon sinks, including to increase afforestation and reforestation, sustainable forest and land use management, access to carbon markets and promotion of customary management practices.
- ▶ **Transportation.** The mitigation policy for the transport sector includes emissions reduction from personal and public vehicles through regulation and promoting the use of public transport in urban areas and between communities.
- ▶ **Waste mitigation.** Policies include sustainable waste management (municipal waste management, reduction in open burning) and a market-based incentive mechanism.
- ▶ **Cross-cutting.** Issues include related policies on disaster risk management, economic diversification, education, gender, health, infrastructure, loss and damage, natural resources management, tourism and water management.

Source: Author's own elaboration based on the Timor-Leste Institute for Development Monitoring's [translation for the Timor-Leste National Climate Change Policy](#).

The UNFCCC-related documents, including the NDC, the National Adaptation Plan, the NAPA and the National Communication documents, have little to no link to employment. The explicit mentioning of “just transition” is absent, while there is limited reference to the climate-employment generation nexus. The latter is typically included within the discussion on risk and opportunities: for example, when referring to job or employment loss due to climate change, especially in agriculture (in the NAPA and the National Adaptation Plan); job creation thanks to economic diversification related to low-carbon transition (in the NDC); or within the discussion on action planning while referring to capacity-building and training programmes (in the National Adaptation Plan and the NAPA).

The main country's framework policy, the [Program of the IX Constitutional Government](#), includes commitment to complying with the 2030 Agenda for Sustainable Development of the United Nations. A section of that framework references the environment and its preservation (section 4.10) and reiterates the commitment to international agreements and obligations, including those linked to climate change. It also underscores the need to adapt to climate change-induced challenges (soil erosion and degradation, flooding, rise in sea level) while the need to preserve and enhance natural resources is reaffirmed as one of the “constitutional duties” of the Government. The direct links between employment generation (or loss) and environmental sustainability are limited:

- ▶ On a general note, the macroeconomic policy section (5.1) of the Program document states that job creation is one of the objectives of the Government, targeting the productive sectors: agriculture, livestock, fisheries, tourism, oil and minerals, and manufacturing and aiming to increase private sector investment by at least 10 per cent annually ([GDRTL 2023](#), 105). There is no direct reference to environmental sustainability.

- ▶ At the same time, in the [Program of the IX Constitutional Government](#):
 - ▶ Some of the interventions envisaged to preserve the environment, such as the call to coordinate between the government entity with responsibility for the environment sector and the government entity with responsibility for the tourism sector or the call for enhancement of the waste management system and the maintenance of the country's biodiversity (linked to terrestrial and marine parks and to ecotourism) and the exploration of blue carbon for carbon sequestration, may have direct employment-generation implications.³²
 - ▶ In section 4.1, the blue economy as a source of development is explicitly weighed against Sustainable Development Goal 14 and the need to preserve the marine ecosystem (GDRTL 2023, 100–104).
 - ▶ The needs to “invest in human resource capacity in environmental monitoring” and to embed “environmental protection and environmental principles” in formal education curricula are openly stated in the Program document (GDRTL 2023, sections 4–10).
 - ▶ The Program document highlights several strategies relevant to a just transition, including social protection provisions for vulnerable groups most likely to be affected by natural disasters (GDRTL 2023, 32, 36), improvement of the national system for disaster management (GDRTL 2023, 138, 140, 146) and ensuring a public consultative and dialogue process in all policy domains, including for new economic sector development planning (GDRTL 2023, 67).

The [National Economic Strategy](#) also makes limited reference to environmental sustainability. A vague reference to consistency with the Sustainable Development Goals (Annex B) and a sustainable tourism sector (p. III-21 of the strategy document) are the most direct ones.

The government officials interviewed for this study revealed limited familiarity with the link between employment and environmental policies and with the concepts such as green jobs. Such limited awareness is reflected in the absence of green employment and just transition measures within the labour market policies. Nevertheless, partial provisions are emerging, such as the inclusion of environmental sustainability for businesses within programmes related to industrial relations, vocational training and job placement. Those same informants however, recognized that because employment creation is central within the development policy and the current Program of the IX Constitutional Government, mainstreaming environmental consideration becomes an urgency to manage the negative environmental impacts of the employment creation policies, especially in nature-dependant sectors, such as the extractive industry and agriculture.

Development of the environment and employment policies now in place was informed by the [Strategic Development Plan 2011–2030](#), which envisions Timor-Leste as an “upper-middle-income country without extreme poverty and having a sustainable and diversified non-oil economy in 2030”. The plan addresses climate change from the perspective of risk to economic development and the dependence of certain economic sectors – agriculture, petroleum and tourism – on the natural endowments. The plan additionally provides the rationale for climate adaptation and mitigation, with agriculture, forestry, fisheries, aquaculture, renewable energy, transport and waste management as related sectors (GDRTL 2011, 56–59). The development scenario focuses on improving the efficiency and productivity of the agriculture sector while using public expenditure to build up the socio-economic foundation in the short to medium terms and promoting private sector development and investment for long-term development, all supported by increasing oil revenues (GDRTL 2011, 204).

³² Also, within the agriculture and fisheries development sections of the Programme document, there are some specific calls to establish agro-ecological zones for sustainable fish production and forest management.

All 12 interviewed informants indicated that the political dynamism and changes in the Government (after elections, reshufflings, etc.) pose challenges for implementing the Strategic Development Plan. The Program of the IX Constitutional Government affirms adherence to the Strategic Development Plan in pursuing economic diversification in the agriculture, tourism and petroleum sectors. But it also continues to emphasize a resources-based economy as a development objective and highlights the importance of oil while introducing a new priority on the blue economy to capitalize on the marine and coastal wealth in achieving sustainable development (GDTRL 2023, 65).

A more direct climate change–economy–employment nexus is embedded in the National Industry Development Policy. Approved in 2023, the policy spells out how the Government envisions innovative industrialization based on agriculture, fisheries, forestry, tourism, mining, construction and manufacturing to complement the oil and mining sector and embed workforce development (GDTRL 2023, 21). The policy explicitly highlights the importance of preserving the environment by strengthening environmental law enforcement and promoting environment-friendly technology that contributes to climate mitigation and adaptation (GDTRL 2023, 14, 17, 22).

Timor-Leste has an institutionalized foundation for the social dialogue process through the National Labour Council. Most of the policies cited here have incorporated provisions for public participation, consultation or dialogue, although they are typically general in scope – tripartism is only explicitly mentioned in the National Economic Strategy.³³ Interviewed informants pointed out progress with the consultative process when developing the climate-related policies. For instance, the Climate Change Base Law and the Climate Change Policy involved much public consultation. The interviewed representatives from the Ministry of Foreign Affairs and Cooperation and the NDCC also described a quasi-formal coordination structure between the Government, development partners and non-government organizations for policy dialogue related to climate change.

Based on this policy landscape, there have been attempts – at least on paper – to foster coherence between climate change, the economy and employment, but they are still fractional and in need of strengthening. Although the Strategic Development Plan and, to a more limited extent, the Program of the IX Constitutional Government provide a foundation for aligning environmental sustainability, just transition principles, economic development and employment strategies, there are gaps in sectoral policies, which remain rather monothematic. This is illustrated in table 6, which provides an overview of the policy landscape relevant for a just transition, using different colour intensities (from dark to light) to indicate the degree of consideration (from none to significant) given to those principles in each policy or strategy.

³³ On budgetary process, the latest Open Budget Survey report noted that the opportunity for meaningful public participation in different stages of the budget process is still low, albeit there was progress in transparency and oversight (IBB 2023).

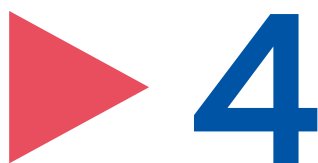
► Table 6. Just transition principles within the policy landscape

Policy document	Strategic Development Plan 2011–2030 (2010)	Program of the IX Constitutional Government (2023)	National Industry Development Policy (2023)	Environmental Base Law (2012)	National Employment Strategy 2017–2030 (2017)	National Adaptation Programme of Action (2011)	National Adaptation Plan (2021)	Updated NDC (2022)	Climate Change Policy (2022)	
Mitigation strategies										Mitigation strategies typically focus on agriculture, fisheries, forestry (carbon market), renewable energy and waste management.
Adaptation and resilience strategies										Adaptation and resilience strategies typically focus on climate resilience infrastructure (especially water and agriculture), biodiversity and disaster risk management.
Green jobs or environment–employment nexus										Green jobs or the environment–employment nexus typically are embedded in the policy prescriptions concerning agriculture, tourism and the blue economy.
Risk reduction or disaster response										Risk reduction and disaster response typically focus on building up institutional capacities (including early warning systems).
Social protection or sustainable social protection strategies										Climate-related provisions in the social protection or sustainable social protection strategies most often are limited to disaster response for vulnerable groups.

Policy document	Strategic Development Plan 2011–2030 (2010)	Program of the IX Constitutional Government (2023)	National Industry Development Policy (2023)	Environmental Base Law (2012)	National Employment Strategy 2017–2030 (2017)	National Adaptation Programme of Action (2011)	National Adaptation Plan (2021)	Updated NDC (2022)	Climate Change Policy (2022)	
Vulnerable populations and community-based protection										Vulnerable populations and community-based protection are considered in all policy domains, although to a different degree.
Sustainable and resilient enterprises										Sustainable and resilient enterprises are rarely considered, and if so, the focus is on incentives or disincentive mechanisms.
Green jobs or environment–employment nexus										The skill development, green skills or capacity-building element typically embeds within the agriculture (sustainable practices) and the public sector (expertise required for planning and mitigation).
Risk reduction or disaster response										All policy design in principle calls for a consultative process, which could have implications for the nexus, but tripartism is only reflected in the National Economic Strategy.

No inclusion
 Minimal inclusion
 Moderate inclusion
 Significant inclusion

Note: The colour coding is based on the prominence of the blue economic consideration within each policy document. The criteria of reference: (a) no inclusion; (b) minimal inclusion: the topic is rarely mentioned and when it is, it is part of broader analysis and limited in scope; (c) moderate inclusion: the topic is frequently mentioned within different topics of the policy and sometimes presented as a subtopic; and (d) significant inclusion: the topic is prominent within the policy, as the main topic or occupying a dedicated part or chapter or is cited prominently in action plans. The last column of the table summarizes the way the climate change change–economic–employment policy nexus is included across all the policies.



Assessment of risk and opportunities from climate transition

This chapter analyses the implications of the climate-related risks on Timor-Leste's economy, labour market and socio-economic structures, based on the physical and transition impacts cited in policy, support programme and corrective measure documents. This analysis provides a reference for identifying gaps and other adequate policy responses and thus allows for choosing economic activities suitable to promoting diversification and employment generation that is sensitive to the climate-related elements.

4.1 Economy-wide impacts

4.1.1 Physical climate risks

Climate hazards, including increased temperatures, rain variability, sea level rise and extreme events (rain, cyclones, droughts and temperatures), have been observed in Timor-Leste and are projected to worsen in the short to long terms (IFRC 2021, 7–9). With most livelihoods being climate-sensitive, the increased exposure is expected to affect the sectors discussed in this section. Although Timor-Leste faces fewer climate hazards than its South-East Asian neighbours (Indonesia and the Philippines), its limited capacity to cope with what does occur makes it one of the most climate-vulnerable countries in the region.

Impact on agriculture, livestock and fisheries

The 2019 Agricultural Census found that an estimated 66 per cent of Timorese depended on agriculture at that time, and 90 per cent of them grew crop products, the top-five being maize, rice, cassava, coffee and coconut (INETL 2020, 37). And 95 per cent of agricultural households raise livestock and poultry to support their livelihoods and provide additional income, especially small livestock (pigs) and poultry birds (chicken and ducks) (INETL 2020, 49). Around half of the coastal agricultural households, especially in Dili, engaged in fishing and aquaculture for alternative livelihood. Most of these households do so for self-consumption and additional income rather than as their main livelihood (INETL 2020, 57).

Previous projections have indicated that climate change could reduce the maize yield by as little as 5 per cent or by up to 20 per cent and increase crop failure (see IFRC 2021, 15). Because most farmers use conventional cultivation methods, their own seeds and depend on a natural irrigation system, the length of the growing season and the productivity depend on the extent of the rainfall season. Changes in rainfall patterns reduce crop suitability and limit agricultural expansion in the North, while a delayed rainy season in the East and a single wet season in the North make maize production vulnerable to drought. The central highlands and southern coast benefit from two wet seasons, allowing two maize crops annually. Rainfed rice paddies in the coastal region face risks from rainfall changes in addition to risks from sea-level rise and coastal flooding (IFRC

2021, 16). When interviewed for this study, informants highlighted how a decrease in household productivity is prompted by the need to slaughter or sell large livestock (cows and bulls) during a food crisis period that would otherwise provide help in their fields.

Extreme weather events also have extreme impact. The increased intensity of cyclone heightens high wind speed, which then triggers intense rainfall and coastal flooding that destroys crops. Extreme rainfall speeds up erosion, leading to landslides, specifically in the highlands, which is important for coffee production. This phenomenon has also led to the destruction of crops, particularly maize and casava, thus increasing the risk of food insecurity (IFRC 2021, 16). The ENSO typically leads to extreme drought and wet seasons, which immensely affect agricultural production. In 2015–16, 50 per cent of the national maize and rice production was destroyed, and half of the population lost their livestock because of the ENSO-led heat impacts and water scarcity (IFRC 2021, 17). The 2021 Cyclone Seroja, which caused flash flooding and landslides, damaged critical agriculture infrastructure and crops and resulted in economic loss from agriculture, infrastructure and housing alone amounting to US\$245 million (14.5 per cent of non-oil GDP) (World Bank 2022). Extreme flooding in the same year destroyed infrastructure in 90 villages and damaged 12 per cent of the country's planted rice area, leading to ongoing losses of 60 per cent of rice yields, valued at \$1.5 million annually since then (FAO 2021, 12).

Although data on the direct impact of climate change to agriculture productivity are unavailable, recent analysis from the National Institute of Statistics on agriculture's contribution to GDP found that the sector had grown slower than the overall economy in the past decade and had experienced considerable decline in recent years in real terms. This is apparent in the massive decline of rice, maize and coffee production (INETL 2024a, 6, 9, 11, 13). When interviewed, a representative of the Ministry of Agriculture, Livestock, Forestry and Fisheries explained that the Government is embracing several measures to mitigate the climate impacts in the sector while building up farmers' resilience. Critical among them are irrigation system rehabilitation, improvement of the seed management system, revitalization of natural water springs in forests and mountain and coastal reforestation. These interventions are reflected in the 2025 State budget (see figure 6).³⁴

Impact on tourism

The tourism industry has long been identified as a sector with great potential for economic diversification, yet progress has been slow, notably due to lack of infrastructure. Climate change represents an additional challenge because the industry heavily relies on natural endowments, with ecotourism³⁵ envisaged as a central direction for national development (TITL, n.d.). The increase in extreme weather events – especially floods and cyclones – along with the degradation of the coastal ecosystems (reefs and mangroves) not only compromises the infrastructure but also reduces the country's attractiveness (IFRC 2021, 17). Around 40 per cent of the coral reef triangle area, of which the Timor-Leste marine area is a part, has deteriorated over the past 40 years due to the changing climate and local threats (coastal deforestation and reclamation, pollution, sewage and destructive marine exploitation) (USAID 2021, 23). In Caimeo Beach, a popular ecotourism destination, changes in ocean and wave level have contributed to the destruction of facilities and disrupted activities, with private sector financial losses reaching approximately US\$1 million in 2020 (USAID 2021, 30). The 2021 flooding in Dili compromised infrastructure, such as water supply, roads and electricity, also leading

34 The La'o Hamutuk notes that, in total, the 2025 State budget for the agriculture sector is almost the same as the previous year. However, the budget's breakdown shows that budget allocation to the Ministry of Agriculture, Livestock, Forestry and Fisheries, the Municipal Agriculture Service, the Oé-Cusse Ambeno Special Administrative Region Authority and the Bamboo Institute are decreasing while the budget for agricultural infrastructure is increasing sharply, by almost 60 per cent (accounting for 33.4 per cent of agricultural budget) (La'o Hamutuk 2025, 1–2).

35 The National Tourism Policy mentions ecotourism in relation with marine and adventure tourism activities, utilizing the country's natural endowments in marine and terrestrial areas, especially the coral reef triangle, while ensuring the environmental protection. The policy seeks to implement the strategy via community-based tourism management, especially to develop products and services in remote areas to optimize tourism and promote the country's identity and culture while avoiding development of mass tourism (GDRTL 2017, 20, 21, 34, 35).

to disrupted tourism activity. The Hotel Association reported that their members lost an average of US\$11,000 due to damaged assets caused by the flooding (USAID 2021, 40–41).

Aware of the importance of tourism, especially ecotourism, for economic diversification, the updated NDC (2022) includes an adaptation programme for the sector (GDRTL 2022a, 42). The National Adaptation Plan also recognizes tourism as a prioritized sector for adaptation, citing the need for support for climate-resilient tourism resources and strengthening the market for climate-resilient nature-based tourism (GDRTL 2021, 46). Progress thus far has been limited. For instance, the Government designated Nino Konis Santana as a national park in 2007,³⁶ but the development of facilities and protection measures for tourism activity remain ongoing (Tourism Timor-Leste, n.d.). There has been progress in governance, such as stipulation of the Biodiversity Decree Law in 2020 and implementation of the United Nations Transitional Administration in East Timor Regulation on Protected Areas where tourism has development potential (Tourism Timor-Leste, n.d.). But adaptation action in the tourism sector is in an early stage and lacks documentation of what has been done.

Impact on physical infrastructure

The most visible impact from the physical risks of climate change is the destruction of key infrastructure. The National Adaptation Plan lists road and bridges, water supply systems, flood defences, irrigation systems and settlements as prone to climate change (GDRTL 2022a, xii). An assessment from the Green Climate Fund in 2019 concluded that the increased impacts of climatic hazards due to increasing climate exposure had led, at that time, to heavy economic losses from infrastructure damage, estimated at nearly US\$263 million (see table 7). With current infrastructure design and construction standards suboptimal for responding to the climate risks and the potential of economic shocks, the country's National Adaptation Plan prioritizes infrastructure as the main tool to pursue climate adaptation (GDRTL 2021, 30).

► **Table 7. Potential increase of impact of climatic hazards on infrastructure, from the 2021 National Adaptation Plan**

Climatic hazards	Increased impact (%)	Potential economic losses (US\$ million)
Landslide	26.3	203.0
Flooding	21.0	37.0
Erosion	55.4	10.0
Drought	55.8	12.5

Source: GDRTL 2021, 31.

Using the NAPA and the National Adaptation Plan, the Government has secured various international funding to improve the country's infrastructure resilience to climate change impacts, including the [Green Climate Fund programme](#), which includes small-scale rural climate-proof infrastructure in six priority districts, the [World Bank climate-resilient road infrastructure projects](#) in the Dili-Ainaro corridor and the [Asian Development Bank's Rural Resilience and Livelihood Improvement Sector Project](#). Although progress in improving infrastructure has been steady and communicated under the NDC, most of the initiatives are funded by or in cooperation with development partners and civil society organizations. Future undertakings are considered conditional to the availability of financial and technical assistance.

³⁶ The national park includes terrestrial and marine areas that cover the eastern tip of Timor-Leste and waters offshore. The Government has nominated the park as a UNESCO Biosphere Reserve to boost recognition and strengthen protection and conservation (UNESCO 2024).

Impact on migration

Climatic hazards affect migration patterns. Climate-induced disasters may cause permanent and temporary displacement and, together with a decrease in productivity, may cause people to migrate in search of alternative livelihood. In Timor-Leste, as previously mentioned, IOM identified the lack of job opportunities and declining agricultural and fishing livelihoods associated with climate change as drivers of migration (IOM 2023a, 6). Findings from a 2023 IOM survey indicated that 36 per cent of internal migrants were concerned about the climate change impact to their livelihood and 9 per cent of migrants who went abroad did so due to environmental factors (IOM 2023b, 58–59). Other research also has documented that climate-induced disasters had caused internal displacement (UC Berkeley, n.d.) due to the permanent or temporary loss of jobs.

According to Lopes (2024, 10) external labour migration and associated remittances have been increasing, making the migrant workers' income a major contributor to the economy, with inbound remittances accounting for 12.6 per cent of GDP in 2023. To optimize this opportunity, the Government is establishing bilateral agreements for limited-in-time labour migration out of recognition of it as a strategy for creating formal employment (APTC 2022). While some evidence points to the benefits of labour migration, especially from the financial standpoint, the impact rarely goes beyond the household level or the short-term perspective in the absence of enabling conditions for re-employment or self-employment of returned migrants (ASEAN and IOM 2024, 11–12, 96–97).

Also as previously noted, although the flows of external migration and remittances are increasing and stable, the latter is mostly spent to cover consumption rather than workforce development, education or physical capital investment (World Bank 2024b, 6). When interviewed, the SEFOPE and trade union representatives anecdotally indicated that migrant workers experience difficulty to reintegrate and find sustainable employment after returning to the country. To address this challenge, the Government, through its National Directorate of Foreign Employment (within SEFOPE), established a Department of Reintegration in 2024 to assist with workers' reintegration.

4.1.2 Transition risks (and opportunities)

The following discussion clusters the analysis in three main areas susceptible to the economy-wide impacts: (a) the low-carbon transition strategy, (b) the nature-based solutions (nature-positive growth and transition) strategy, both embedded in the 2022 NDC; and (c) climate finance, one of the instruments to support the commitment to climate transition.

Low-carbon transition strategy

Energy and renewable energy. Energy transition through a fossil fuel phase down is central to global climate action. Such a transition is expected to create economic consequences, such as reducing growth, creating inflation, limiting fiscal space and worsening the labour market in oil-dependent countries, with the developing economies facing greater risk.³⁷

Because the oil sector remains central in Timor-Leste's development strategy, the global energy transition will thus make the country most vulnerable. From this standpoint, the country appears to be in a double jeopardy: On one hand, most of the oil production is for export (accounting for 98 per cent of total exports), particularly to China and Japan (EITI, n.d.). Japan, the main oil export destination, is diversifying its energy sources and has updated its primary energy mix target for electricity generation, thus reducing the share of oil and gas while considerably increasing the renewable energy share (Cahil et al. 2024). China has made significant progress in its energy transition, supported by new energy solutions and technologies that boost renewable

³⁷ A recent estimate suggested that power transition-induced changes in international trade could enhance progress towards the Sustainable Development Goals in developed economies while jeopardizing the progress of developing economies involved in their power generation supply chains (Peng et al. 2023).

energy creation (WEF 2024, 4, 6, 12). These trends are occurring as the worldwide demand for oil and gas is predicted to peak by the end of this decade, and there will then be a subsequent fall by 75 per cent by 2050 (IEA 2024, 13). On the other hand, the reliance on international partners for technology and production has implications for fiscal revenue and longer-term planning. Australia, the main oil and gas partner for Greater Sunrise exploration, is implementing stricter measures to limit emissions (DISR 2024), adding technical and governance complexities to the project's future feasibility. According to the International Energy Agency, stricter measures to slash emissions from fossil fuel company operations will be one of the initial policies implemented for the energy transition globally (IEA 2024, 13, 14).

Timor-Leste's reliance on diesel imports for electricity generation creates vulnerability to price volatility and increased operational costs, in turn affecting the power company's profitability and, possibly, sustainability, while the role of renewable energy remains limited. Over the past decade, four diesel-oil power plants were built that generate sufficient power for the domestic energy needs. But because they are incurring high costs, the resulting energy prices are consequently high. At the same time, the use of renewable energy power for on-grid electricity generation is non-existent due to its long lead time (EDTL, n.d.).

Despite the tremendous potential, renewable energy accounted for only 7 per cent of the national energy supply (all off-grid) in 2021, sourced entirely from bioenergy produced from biomass for household use (IRENA 2024, 1, 4). More recently, there has been progress in setting up pilot projects for solar energy, biogas, hydropower and efficient cook stoves, supported by international aid and with the Government considering future expansion of these projects to off-grid areas (GDRTL 2022a, 14–15). None of these projects, however, seems sufficient to guarantee achievement of the Strategic Development Plan's 2025 target of 50 per cent of power sourced from hydro, wind, solar and biomass facilities (GDRTL 2011, 87–92).

Renewable energy sources have great potential for power generation, but the target set out in the national low-carbon transition plan is modest, with implementation relying heavily on international support (GDRTL 2022a, 46). The NDC refers to the use of renewable energy for rural and off-grid electrification, improvement of current power plant efficiency (including a plan to use carbon capture storage under the Climate Change Base Law) and regulation of the petroleum sector to achieve emissions reduction.

The updated NDC (2022) also lists a conditional commitment for enabling cost-effective energy efficiency improvements. The plan is expected to be carried out via the enforcement of product efficiency standards, energy-efficient building designs, new fuel standards and improved regulation for industrial processes and household energy consumption (GDRTL 2022a, 36). With limited resources, the Government will prioritize cost-benefit evaluations and seek international support for implementation.

Waste management. The updated NDC (2022) addresses waste and wastewater management, focusing on landfill, industry, household and medical waste, with plans for sustainable solutions through circular economy principles and activities (composting, recycling, biogas production and a market-based economy) (GDRTL 2022a, 37). However, the plan is unclear and has no further elaboration on implementation, with is almost entirely contingent on international support. Waste problems are severe in urban areas like Dili, where effective waste management is lacking amid high population density (Ray 2021; Ximenes da Costa 2018; Ximenes, n.d.). This lack of infrastructure and public awareness contributes to environmental degradation, as highlighted within the interviews conducted with the NDCC and trade union representatives. Heavy rain and flooding increase the waste pollution risks to health and environmental quality and may in turn impact agriculture and tourism (Ray 2021). The most recent waste audit (2023) revealed that almost 60 per cent of municipal solid waste in Timor-Leste is organic, followed by paper (at 18.9 per cent) and plastics (at 6.6 per cent) (SPREP 2023, 8). This presents an opportunity for a circular economy, with the Government planning to implement “reduce, reuse and recycle” principles (Tatoli 2023).

Additionally, a 2019 study estimated that organic biomass from agricultural and urban solid waste could produce enough bioenergy to replace diesel in current power generation, either by co-firing existing plants or developing biogas plants (Fraga et al. 2019). At the grass-roots level, small-scale compost production by

non-government organizations promoting organic fertilizer shows economic potential, though limited (USP 2025; CRS 2023). Various development projects and international cooperation support recycling businesses in Timor-Leste, albeit with limited economies of scale (see UNDP 2022a; Mercy Corps, n.d.; VSA, n.d.).

Nature-based solutions (nature-positive growth and transition)

According to the International Union for Conservation of Nature, nature-based solutions are actions to protect, sustainably manage and restore natural and modified ecosystems, in ways that address societal challenges effectively and adaptively to provide both human well-being and biodiversity benefits (IUCN 2020, 1).

Timor-Leste used nature-based solutions as a guiding principle for the National Adaptation Plan, incorporating biodiversity and ecosystem services into its adaptation strategy (Qi 2021, 4). This approach successfully mobilized international development assistance for nature-based solutions initiatives, with several interventions yielding socio-economic benefits already that have enhanced ecosystem conditions and community livelihoods, albeit usually without sustainability. For example an NGO-led initiative combining indigenous seeds and nature-based techniques in conservation agriculture and agrobiodiversity has improved farmers' incomes and helped communities avoid climate-induced food crises (SeedChange 2020; Webster 2020; RAEBIA, n.d.).

Similarly, a Ministry of Agriculture, Livestock, Forestry and Fisheries-led conservation and agriculture programme using high-yielding certified seeds and sustainable farming practices has increased farm profitability for approximately 5,000 farming families (ACIAR 2023; Bonis-Profurmo, McLaren, and Franzo 2019, 118). These and similar approaches³⁸ share common characteristics: participatory implementation, adaptation to the natural environment and leveraging scientific methods for determining inputs and techniques that have required farmers' training and support from skilled assistance (often by field facilitators or extension services). Concerns about the sustainability of these initiatives looms because many of the interventions are at the pilot stage and managed through project-based efforts, often supported by development partners.

The updated NDC (2022) enhances the nature-based solutions focus by outlining the "nature-positive growth and transition" strategy alongside the low-carbon transition strategy. It emphasizes climate mitigation and adaptation activities that enhance natural integrity, optimize carbon sequestration and improve the resilience of the country's natural capital. The NDC states that "Timor-Leste intends to capitalise on mitigation and adaptation co-benefits that can be derived from carbon farming, ecosystem restoration, agroforestry, blue carbon management and other activities that help to expand and protect carbon sinks and reservoirs... contingent on access to climate financing and technical assistance" (GDRTL 2022a, 30). Planned nature-based solutions initiatives include sustainable forest management integrating customary approaches (Tara Bandu), marine and coastal carbon sinks via the blue carbon initiative, expanding carbon market access through UNFCCC article 6 mechanisms and promoting sustainable and climate-smart agriculture (GDRTL 2022a, 31).

Although nature-based solutions may not generate quick profits like the traditional sectors, they could offer various economic development opportunities, such as promoting new sectors, improving productivity in existing ones, diversification and creation of new jobs (European Commission 2021, 85).³⁹ For Timor-Leste the implication is that investing in nature-based solutions should consider all benefits – short- and long-term ones, such as improving climate resilience – rather than looking at the short-term economic return.

38 For instance, the [Transforming Rural Lives Through Adaptation and Carbon Capture](#) Project, implemented by the World Wildlife Fund and Caritas, planted 73,000 saplings across ten villages in Baucau and Viqueque. The project promoted agroforestry and reduced deforestation while providing co-benefits for the local community via payment to environmental services or the several development projects in coastal areas including seaweed farming as an alternative livelihood to reduce mangrove deforestation. The initiative helped local communities diversify their economy by introducing environment-friendly techniques, providing skills training and connecting them to export markets (Inclusion_TL 2024).

39 A comprehensive evaluation of nature-based solutions implementation concluded that they are effective in mitigating climatic hazards and economically feasible (Vicarelli et al. 2024).

Role of the carbon market. As the carbon market becomes critical for creating community benefits under nature-based solutions, the implementation of article 6 of the UNFCCC⁴⁰ offers Timor-Leste an opportunity to explore additional revenue streams. Article 6 establishes a carbon trading system, enabling the buying and selling of carbon credits. Carbon farming has been implemented in Timor-Leste via voluntary carbon trading, but it lacks the necessary regulatory framework and is mostly contingent on partners. The Government is working to optimize the carbon sequestration potential by providing regulation, including through the Climate Change Base Law, and leveraging climate negotiations. This step is critical, according to previous ILO research that documented how the ineffective design of carbon markets can create unwanted consequences in employment and inequality, particularly for micro, small and medium-sized enterprises, informal workers, indigenous people and marginalized groups (ILO 2024b, 1).

Climate finance

Despite its limited capacity and reliance on international assistance for climate action, Timor-Leste has effectively gained access to climate finance.⁴¹ Under the UNFCCC mechanism, the country has accessed the Green Climate Fund, the Adaptation Fund and the Least Developed Countries Fund (managed by the Global Environment Facility). So far, the Green Climate Fund has allocated US\$65.3 million for four projects (GCF, n.d.), while the Global Environment Facility has allocated more than US\$30 million for national projects (GEF, n.d.), on top of allocations for regional projects (which include Timor-Leste).

These climate funds have been pivotal for Timor-Leste's adaptation and mitigation strategies. When interviewed for this study, representatives from the Ministry of Foreign Affairs and Cooperation, the NDCC and the National Designated Authority for Climate Change revealed that most of the activities listed under the NAPA and the National Adaptation Plan have been supported by these funds. Further support is expected, they added, for adaptation, mitigation and loss and damage activities listed within the National Adaptation Plan and the NDC. Most of the activities listed in the updated NDC (2022) are explicitly conditional upon the availability of international assistance, with the unconditional commitments – those based on national resources – focused on governance improvements.

To better address climate adaptation and mitigation, the Ministry of Finance, with United Nations Development Programme support, conducted a comprehensive review of climate-related public expenditure covered by the Consolidated Fund of Timor-Leste, the Infrastructure Fund and development partners between 2018 and 2021. The assessment concluded that actual public expenditure on climate-relevant programmes was declining, including from development funds (MOF and UNDP 2022, 10). Actual spending for infrastructure was lacking, except for roads and bridges, which received the largest share of public funding in that time period.⁴² In addition, critical areas, such as agriculture and private sector development (MOF and UNDP 2022), face immense funding gaps. Gaps are also apparent in the so-called “social capital development”, such as education and social inclusion (see table 8).⁴³

40 Article 6 provides the framework for establishing a carbon-crediting mechanism in which countries can transfer carbon credits earned from the reduction of greenhouse gas emissions to help one or more countries meet their climate targets (UNFCCC, n.d.).

41 The UNFCCC defines climate finance as local, national or transnational financing drawn from public, private and alternative sources that seeks to support mitigation and adaptation actions that will address climate change (UNFCCC, n.d.).

42 The nationally defined budgetary items receiving the larger public expenditure between 2018 and 2021 were roads and bridges (at US\$103,854,420), agriculture (US\$25,549,948), health (US\$19,514,591) and urban and rural development (US\$14,360,315) (MOF and UNDP 2022, 10).

43 Within the review of climate expenditures, the tracking of allocations for public expenditure related to employment or just transition measures was not straightforward, given the overarching nature of the transition policy. For instance, some measures related to livelihood assistance for local communities were provided under the agriculture and tourism sectors and allocations for preparing future workers' capacity came under the health sector. Institutional strengthening and support for micro, small and medium-sized enterprises and cooperatives can be traced to rural development and private sector development, while interventions to support education and social protection are found under social inclusion.

► **Table 8. Mapping of public expenditure and institutional gaps for climate-relevant programmes (budget tagging)**

Pillar	Sector or focus area	Evidence of climate vulnerability	Policy response	Institution	Climate public expenditure
Social capital	Education				
	Health				
	Social inclusion				
	Environment				
	Cultural heritage				
Infrastructural development	Roads and bridges				
	Water and sanitation				
	Electricity				
	Sea ports				
	Airports				
	Telecommunications				
Economic development	Rural development				
	Agriculture				
	Petroleum				
	Tourism				
	Private sector development				

■ High attention needed
 ■ Moderate attention needed
 ■ Adequately attended to

Source: MOF and UNDP 2022, 11.

When interviewed, representatives from the Ministry of Foreign Affairs and Cooperation and the National Designated Authority for Climate Change explained that the Government is focusing on governance and organizational capacity improvements by provisioning regulations for institutional strengthening, improving the Designated Authority's governance and promoting national organization accreditation for climate fund access.

4.1.3 Summary of economy-wide impacts

► Table 9. Risks, impacts and economy-wide challenges and opportunities

Risk	Area	Direct impact (if risk occurs)	Challenges	Opportunities	Sectors potentially affected
Physical	Agriculture, livestock and fisheries	Damaged assets, loss of productivity, loss of income, activity disruption	Increased and intensified hazards, lack of infrastructure availability and readiness (especially irrigation), absence of climate-related early warning systems, conventional agricultural techniques	Prioritized sector for government programme and “climate–public expenditure” (including for infrastructure development)	Agriculture, livestock, fisheries, construction, public sector
	Tourism	Damaged assets, loss of income, activity disruption	Increased and intensified hazard, lack of infrastructure readiness	Prioritized sector for adaptation programme (ecotourism and blue economy)	Tourism
	Infrastructure	Destruction of essential infrastructure	Non-climate proof design, lack of financing capacity	Prioritized programme for national adaptation and mitigation (climate resilience infrastructure)	Construction
	Migration	Climate-induced migration	Increasing hazards lead to increased migration, lack of enabling environment for optimizing remittances	Increasing and stable flow of financial remittances for household adaptation, labour migration as a skilling pathway, organizational reform for reintegration support	Direct impact on financial flows and on availability of labour force in Timor-Leste and destination countries
Transition	Low-carbon transition	Reduced oil and gas demand, increased compliance and energy costs, fiscal risks	Significant dependency on petroleum sector, uncertainty on future production, high electricity generation costs	Emerging renewable energy piloting, circular economy potential from organic and plastic waste	Oil and gas, power generation, renewable energy, waste management, recycling industry
	Nature-based solutions	Improved environmental protection and livelihoods	Lack of institutional capacity, lack of awareness	Prioritized programme for adaptation and mitigation (smart agriculture, afforestation or reforestation, carbon sequestration), international carbon trading mechanism	Agriculture, forestry, aquaculture, tourism
	Climate finance	Access to climate fund	Suboptimum institutions, significant expenditure gap for economic sector and infrastructure	Emergence of various climate finance mechanisms, institutional improvements	Financial services industry, public administration, international development cooperation

4.2 Labour market implications

This section looks at the possible impacts on the labour market, employment pathways and skill needs.

4.2.1 Physical risks

The previous economy-wide impact analysis shows that sectors, such as agriculture and tourism, have experienced (and will continue to experience) significant impacts from the climate-related physical risks. In addition, infrastructure has suffered damages that have possibly triggered broader productivity losses.

Although data on the employment impacts from climate change in Timor-Leste are limited, several indicators suggest adverse effects. Past disaster data from the United Nations Economic and Social Commission for Asia and the Pacific showed that from 1970 to 2021, more than 277,000 people were affected by droughts, cyclones and floods related to climate change (ESCAP, n.d.), which disrupted their jobs and livelihoods temporarily or permanently. The agriculture sector's productivity, which has been declining over time due to poor soil fertility, unsustainable farming practices and limited knowledge and availability of fertilizer, is further exacerbated by climate change (Bonis-Profurmo, McLaren and Franzo 2019, 104).

The interviews conducted for this study corroborated these findings. For instance, the trade union representatives noted that agricultural communities have experienced long dry seasons in the past four years that have considerably affected productivity and caused crop failures. Their observation aligns with the National Account data, in which agricultural value-added reflected a decreasing trend from 2015 to 2020 in real terms and in GDP share, before it increased gradually as of 2021 (INETL 2024b). The NDCC representative highlighted the increased risk of crocodile attacks on traditional fishers that might be related to climate-induced biodiversity changes. Although no assessment has substantiated that claim, previous research concluded that climate-induced hazards led to increased subsistence fishing, thus naturally increasing the likelihood of potential victims from crocodile attacks (Brackhane et al. 2024). A Ministry of Agriculture, Livestock, Forestry and Fisheries representative reported that rain variability has caused crop failures, with heavy flooding compromising irrigation systems and pushing farmers to skip their planting season due to the lack of seed management. This claim aligns with evidence reported in several previous assessments (see Oxfam, n.d.; WFP 2023; IFRC 2021), linking the implication of climatic hazards to agricultural income and job destruction.

Various evidence also points to increased temperatures leading to great impact on workers' health and productivity due to heat-stress, which is associated with health and safety issues (OECD 2024; Amoadu et al. 2023; ILO 2019). Previous ILO modelling concluded that temperatures above 24°–26°C are associated with reduced labour productivity; for example, at 33°–34°C, a worker operating at moderate work intensity loses 50 per cent of their work capacity (ILO 2019, 13). Based on this assumption, workers in Timor-Leste are under high risk, considering that the maximum daily temperature estimate is already at around 30°C and will reach nearly 33°C by 2060 (World Bank, n.d.). The ILO modelling estimated that Timor-Leste will lose nearly 0.4 per cent of working hours by 2030, which corresponds to 2,000 full-time hours of employment, especially in the agriculture and construction sectors (ILO 2019, 62). Workers within these sectors also face disproportionate risk because many of them experience high physical exposure and work in precarious conditions with minimum labour protection.

When confronted with these repercussions, affected communities sometimes resort to maladaptive coping mechanisms. For instance, the trade union representatives reported during the interviews for this study that in the aftermath of weather hazards, many agricultural households sell (including livestock) and/or turn to alternative livelihoods, typically more vulnerable and temporary, such as construction and subsistence

farming, and/or send family members to an urban area or across borders seeking informal and low-skill employment.⁴⁴

Various government programmes targeting these issues, such as the normalization of irrigation systems, equipment support, seed and fertilizer subsidies and expansion of agricultural extension workers, are in the pipeline and a budget is earmarked. However, challenges remain, as stressed during the interviews with representatives from the Ministry of Agriculture, Livestock, Forestry and Fisheries and the NDCC, who confirmed that budget allocations and limitations in the infrastructure will limit the policy's impact.⁴⁵ The trade union representatives expressed concern regarding the targeting mechanism, noting that the agricultural subsidy for hazard-impacted farmers has not yet reached its intended target, which a previous report (World Bank 2023a, 11) also pointed out.

Nonetheless, the proposed adaptation programmes are expected to impact employment, particularly by generating jobs within the construction sector to facilitate the development of climate-resilient infrastructure and infrastructure for climate resilience. For instance, according to representatives from the Ministry of Foreign Affairs and Cooperation and the NDCC, previous programmes funded by adaptation funds had created jobs especially for local communities (although temporary ones). The trade union representatives added that these infrastructure projects provided well-valued alternative livelihoods for rural communities adversely impacted by climate-induced hazards, although the work and salary conditions were deemed improvable.

4.2.2 Transition risks and opportunities

The employment impact from the climate transition can lead to jobs creation in emerging or developing sectors, changes in existing jobs and the phase-out of some jobs in carbon-intensive activities (Sharpe and Martina-Fernandez 2021). Such transition may require adjustments in workers' skills, with evidence pointing to how the availability of skilled workers will be crucial for the successful transition to sustainable technologies (ADB 2023, 1). In turn, such transformation underlines the importance of workforce planning and skill development as part of the transition strategy, especially for workers in the climate-vulnerable sectors or sectors linked to global and national climate action (Sakamoto 2019).

Mining and energy generation

As previously discussed, the oil industry will soon be affected by decreasing demand and increasing requirements to limit carbon emissions, which will affect project financing and profitability. In 2021, the oil industry employed 6.1 per cent of the workforce (see 7.2 in figure 7), which, while a small share of the total, includes many highly skilled workers (TIMOR GAP, n.d.). Current political discussion pays limited attention to the possible reduction in the global demand, and the main plan for job creation is heavily reliant on the petroleum-based industry, with the Tasi Mane Project expected to create up to 10,000 direct jobs and 50,000 indirect jobs in extraction and basic manufacturing (see the Program of the IX Constitutional Government, Chapter 4.3). In the electricity generation sector, Timor-Leste's current and future pathway remains focused on fossil-fuelled sources. The current on-grid energy system depends on diesel imports and managed by

44 This information matches with the reported evidence from community experiences in which their ability to adapt depends on their pre-existing vulnerabilities and capacities (including assets, networks and skills) as well as the availability of government support to increase resilience (Oxfam, n.d.). In other words, lack of means leaves vulnerable groups to bear disproportionate risks and consequences on their work and livelihoods (such as women must bear additional burdens for care and work).

45 A Ministry of Agriculture, Livestock, Forestry and Fisheries representative cited lessons learned from the domestic food security programme, wherein the Government bought directly from farmers to supply its rice subsidy needs but then experienced logistical setbacks due to lack of infrastructure.

the State-owned enterprise Eletricidade de Timor-Leste. Like the petroleum industry, this sector employs a small and highly skilled workforce (see 7.1 in figure 7). Previous research found high skill transferability from the oil-related industries to the renewable energy and carbon sequestration, or climate-compatible, sectors, like manufacturing (Emden, Sudmant and Farinha 2024; Brannstrom, Ewers and Schwarz 2022).

The renewable energy sector is expected to experience global growth, thus increasing workforce needs. According to the International Renewable Energy Agency and the ILO, the largest increase in global renewable energy jobs to date occurred in 2023, reaching 16.2 million (18 per cent growth), with most jobs concentrated in China, the European Union, the United States and India (IRENA and ILO 2024, 10). Previously, the sector was projected to create up to 38.2 million jobs by 2030 (IRENA and ILO 2022, 8). Among the opportunities, technical and medium-skill jobs are highly sought after, with high demand for building and related trade workers, elementary labourers in manufacturing, construction and transport as well as skilled agricultural workers.⁴⁶

The current and future national energy system is not geared towards a substantial switch to renewable energy, aside from its utilization for rural off-grid areas under the mitigation and low-carbon transition plans. Thus, the employment impact is likely to be limited, concentrating among the skilled workforce for installation, operation and maintenance. It has yet to be considered that the increased demand for renewable energy will intensify foreign demand,⁴⁷ a condition that may affect labour migration patterns for (qualified) Timorese workers.⁴⁸

A bigger employment impact can be expected if consideration is given to greening the primary energy mix for the on-grid energy system. For example, utilization of biomass in the current power plants (co-firing) or new biogas power plants, as proposed by previous research (Fraga et al. 2019), could potentially create jobs in power generation and its supply chains (agriculture, forestry and biomass distribution), even if it necessitates training for power-generation workers.

Waste management

The low-carbon strategy within the NDC includes a dedicated programme for the waste management industry. If the programme is implemented, there will be changes in operational procedures consistent with environmental sustainability and entailing the need to reskill the workforce (such as composting organic waste for biofertilizer skills). There is also potential for employment generation in the recycling industry and related services, such as biomass and fertilizer distribution, recycling enterprises and retail for recycled products.

At the current implementation pace of change, the employment generation impact would likely be small due to the scale of the undertakings. Indeed, most projects are initiated by social enterprises backed by international assistance. Implementing a circular economy for waste management would improve the jobs-

46 Sector-wise, construction and manufacturing make up the majority of jobs in demand for the renewable transition (ADB 2023, 5).

47 Considering that workforce development is constrained by the nature of renewable projects, there are limitations to internal labour supply (demographic conditions or unmatched sector concentration) and competition across interconnected sectors (Briggs et al. 2022)

48 For instance, in Australia, the electricity generation sector will need more than 30,000 additional workers by 2029 to achieve their net-zero target, particularly from the construction phase. However, the trend shows extreme patterns, with the industry expected to see a major upswing of 27,000 new jobs from 2025 to 2029, followed by a sharp drop-off of 24,000 jobs from 2030 to 2033 (Rutovitz et al. 2024, 3). This condition poses a risk for ensuring a sufficient workforce supply and aligning workforce development in the longer term to meet climate targets. A similar condition is projected in the ASEAN region, whereby the energy transition can create significant jobs but is concentrated in countries with more immediate international support, such as Indonesia and Viet Nam (ASEAN and IOM 2024, 106-107). This can lead to changes in labour migration patterns.

generation potential and improve climate resilience in the long term.⁴⁹ However, concerns surrounding the quality of the created jobs loom, with global data confirming growing employment in the waste and recycling industries accompanied by challenges, such as informality, low wages, low working hours and substantial health hazards (ILOSTAT 2024). Representatives with the NDCC, SEFOPE and trade unions pointed out in their interviews that successful waste management is challenged by the lack of community awareness and municipal waste facilities' capacity, which seems to have experienced little or no improvement over the past years.⁵⁰

As for the skilling needs, most waste management pilot projects include a training component (UNDP 2022; Mercy Corps, n.d.; VSA, n.d.), which seems to be sufficient for supporting implementation.

Nature-based solutions

The introduction of nature-based solutions for the climate transition in Timor-Leste can support employment generation. Global estimates indicate that increased investments in nature-based solutions to meet the Rio Conventions⁵¹ target could create an additional 20–32 million jobs by 2030, particularly in agriculture and forestry (ILO and IUCN 2024, 7) and that such an employment impact would be more pronounced in lower-middle-income countries with natural endowments and international resources mobilization (ILO and IUCN 2024, 54), such as Timor-Leste.⁵²

Regarding the type of jobs that will be created, they likely will consist of skilled agricultural, forestry and fishery workers, elementary occupations and craft and related trade occupations (ILO and IUCN 2024, 57). Although manual and elementary work in the agriculture sector, including subsistence farmers, will be the majority (ILO and IUCN 2024, 61–62), high-skill quality jobs will also emerge, especially for market-oriented skilled agricultural workers in the public sector who perform such tasks as monitoring and management (ILO and IUCN 2024, 59–61). Table 10 summarizes the top-five occupations for nature-based solutions implementation in the Asia and Pacific region and the associated skills needs encompassing both technical and core skills, which is of possible relevance for Timor-Leste (ILO and IUCN 2024, 107–109). The mapping indicates that most jobs concentrate in low- to medium-skill levels and labour-intensive activities. Collaboration with stakeholders and effective communication are considered the most critical core skills for all occupations, while project management and problem-solving skills are particularly relevant for high-skill occupations. In terms of technical skills, monitoring and evaluation of nature-based solutions benefits are highly emphasized, with data analysis following closely. The application of ecosystem and biodiversity knowledge is highly valued for the sustainable use, management and restoration of natural resources.

49 For example, reducing chemical fertilizer use, improving soil conditions and improving occupational health in agriculture, reducing power-generation costs and reducing health and flooding risks to communities from plastic waste.

50 Ximenes da Costa 2018 documented this situation.

51 The Rio Conventions refer to three international environmental agreements negotiated at the 1992 Earth Summit in Rio de Janeiro: the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification. The conventions address climate change, biodiversity conservation and desertification, respectively, and work collaboratively to promote sustainable development.

52 The Asia and Pacific region has the largest share of current and future nature-based solutions employment, particularly in restoration and sustainable land management (ILO and IUCN 2024, 56).

► Table 10. Top-five occupations for nature-based solutions in the Asia and the Pacific region

Occupation	Description	Skill level
Conservation worker	Perform manual labour to restore and protect natural habitats, such as planting, weeding, building needed structures and other maintenance activities.	Low to medium
Park ranger	Responsible for maintaining protected natural areas, ensuring conservation and monitoring biodiversity.	Low to medium
Field facilitator	Support community engagement and project implementation by providing technical support, delivering outreach, coordinating with local stakeholders, documenting implementation and promoting nature-based solutions practices.	High
Environmental specialist	Responsible for assessing, managing and ensuring the ecological integrity of the project by applying scientific knowledge to the design, implementation and monitoring of nature-based solutions interventions.	High
Project manager	Responsible for overseeing the planning, execution and completion of nature-based solutions projects, including team coordination, managing resources, setting and monitoring project timelines, ensuring compliance and engaging stakeholders.	High

Source: Based on ILO 2024, 102–105.

Nature-based solutions potentially offer respite to the youth employment challenge in the country due to the larger concentration of youth workers relative to global employment (at 14 per cent versus 12 per cent), possibly attributed to increasing environmental awareness among young people (ILO and IUCN 2024, 40, 63). An officer with a youth-oriented environmental civil society organization confirmed during an interview for this study that there is growing interest on environmental issues among young people, even if accompanied by a declining interest in the agriculture sector.⁵³ This situation implies that capacity-building components, including awareness-raising, are critical for Timor-Leste to optimize the nature-based solutions employment opportunities for youths.

Nature-based solutions also can improve employment outcomes for agricultural workers through climate-resilient agriculture. The representatives from the trade unions, the Chamber of Commerce and Industry, SEFOPE and the Ministry of Agriculture, Livestock, Forestry and Fisheries echoed previous reports (such as World Bank 2023b, 40) when they indicated that the sector's low income relative to alternative urban or overseas employment prompted the declining agricultural workforce, which has led to both reduced productive land and decreased output (European Commission 2023). And yet, because previous nature-based solutions initiatives show that the approach can increase production output (SeedChange 2020; Webster 2020; RAEBIA, n.d.) and pioneer profitable and more inclusive economic activities, such as seaweed farming (MDF 2024; Iyengar 2024), there may be an economic incentive to engage in agricultural activities. Already-implemented nature-based solutions initiatives represent a promising precedent (see the Chapter 4 section on physical climate risks).

⁵³ This insight aligns with previous findings on youths' negative perceptions of the sector, which is prompted by their lack of awareness of market-driven agriculture and skills on managerial and technical aspects. But they show strong interest for knowledge improvement (FAO n.d.).

A less explored diversification opportunity within Timor-Leste's climate strategy is nature-based solutions tourism. This activity can generate jobs and diversify rural economies by channelling tourist spending into local activities, transportation, food and accommodation. It may also provide crucial funding for biodiversity conservation through entrance fees and other financing mechanisms (World Bank 2024a).⁵⁴ Economic modelling by the World Bank revealed that promoting sustainable protected area tourism can create direct or indirect jobs for locals, ranging from 3 to 30 per cent of the working-age population, depending on visitor numbers (World Bank 2021a, 50–51). Jobs created in nature-based tourism include tourism promoters, environment educators, rangers and biologists, with essential skills encompassing wildlife guiding, marketing and digital skills (ILO and IUCN 2024, 98). The NDCC representative explained, when interviewed for this study, that the Government plans to leverage the blue economy development strategy with nature-based tourism in the coral reef triangle area by creating a *Peace Natural Park* in cooperation with the Indonesian and Australian governments.

The opportunities from nature-based solutions closely link to climate financing. Most international support for Timor-Leste is concentrated on adaptation and mitigation targets related to nature-based solutions. And the economic benefit from nature-based solutions includes maximizing the revenue generated from the carbon credit market and other types of funds linked to climate financing. If that is realized, a demand should arise for emerging occupations, such as green finance analysts, environmental economists and sustainability consultants with proficiency in natural capital accounting and carbon accounting (ILO and IUCN 2024, 98).

Although job opportunities from the nature-based solutions may occur, those types of jobs are often tied with precarity. For instance, more than 75 per cent of workers engaged in nature-based solutions are part time-workers (ILO 2022, 18), often involving volunteer work (ILO 2022, 105) and high informal employment, especially in projects in rural areas (ILO 2022, 110). Ensuring that nature-based solutions are designed properly is necessary. Within this domain, workers' organizations and trade unions have an important role to ensure awareness-raising and access to training and then monitoring implementation. The KSTL, for example, has started mainstreaming environmental awareness and green skills into its training programmes.

Climate-resilient infrastructure and climate financing

Timor-Leste's climate transition strategy entails the needs of climate-proof infrastructure as part of climate adaptation, mitigation and the low-carbon and nature-positive growth and transitions. Consequently, job creation opportunities will emerge in the construction sector to support projects that build new climate-proof infrastructure or improve existing infrastructure. Job creation had been observed in previous climate-infrastructure development (associated with public expenditure, as mapped in table 8) and is expected to arise in the planned programmes listed in the climate transition strategies (see Chapter 4). The low-carbon transition strategy also entails energy efficiency improvements to reduce carbon emissions, including energy-efficient building design (GDRTL 2022a), which can transform the sector and create opportunity for green construction – albeit limited and with implementation conditional on international assistance.

Nevertheless, constraints over the temporal and precarity nature of the construction works and the lack of skilled construction workers in Timor-Leste exist. When interviewed, representatives from the Ministry of Foreign Affairs and Cooperation and SEFOPE pointed out how public infrastructure projects provide temporary alternative employment, especially for local communities, while the trade union representatives thought

⁵⁴ The World Bank identified various economic avenues from nature-based tourism that can support conservation and create economic benefits, including visitor entrance fees, tourism concessions, leasing fees and other financial mechanisms, including conservation trust funds, carbon finance, conservation bonds and public-private management partnerships (World Bank 2024, 13–14).

that the decency of these jobs is suboptimum. The [Timor-Leste Enterprise and Skills Survey 2022](#) also found that the construction sector has a high degree of separation, affirming the temporality of the jobs while also noting it has one the largest skill gaps (GDRTL 2022b, 13, 14). On a related note, the representative from the National Designated Authority for Climate Change reported that the agency is reviewing and evaluating the requirements of climate public expenditure, with the aim of enhancing the effectiveness of climate financing for the national economy, including by integrating measures for job creation.

With most of the climate transition linked to climate financing, employment implications are expected to emerge in the financial service industry. The Government's plan to optimize the carbon trading mechanism and other alternative climate financing mechanisms to support the climate actions requires skilled professionals in sustainable finance and environment sustainability to occupy roles, such as green financial analysts, environmental economists and sustainability experts. Although limited in number, these positions will be vital for national financial institutions, policymakers and climate project management teams.

4.2.3 Summary of employment opportunities and implications for workforce development

Sizeable employment opportunities from the climate transition for Timor-Leste can be generated through three streams:

- ▶ **Renewable energy.** Renewable energy generation to respond to local energy needs requires workers for installation, operation and maintenance. The renewable energy potential is not yet fully exploited due to limited use in the existing and planned energy systems, despite the abundance of resources and the socio-economic and environmental benefits. Opportunity also exists from circular international labour migration to address the construction workforce shortage for foreign renewable energy projects, especially in Australia and the ASEAN region. The energy transition target has created a shortage of qualified workers, especially for countries beginning to consider migrant workers as a solution, which could generate formal employment (abroad) and upskill the Timorese workforce to then support national projects in the medium to long terms.
- ▶ **Climate-resilience infrastructure development.** The adaptation plan requires the development and improvement of public infrastructure that is climate resilient, with interventions primarily focused on roads and bridges. Adaptation strategies for sectors, such as agriculture, also include provisions for infrastructure development. The utilization of renewable energy and nature-based solutions energy will also require infrastructure development. These climate-infrastructure projects consequently will create employment. Additionally, implementing green construction practices into climate infrastructure development will further add environmental benefits aligned with climate targets but will necessitate a skilled workforce, especially for design work and project management. This expertise also will be sought for implementing energy-efficient measures in the built environment to reduce carbon emissions, although limited at the current pace.
- ▶ **Nature-based solutions.** Implementing nature-based solutions for adaptation and mitigation programmes, coupled with the development of global climate finance commitments and mechanisms, can create new employment and/or improve livelihoods while creating positive impact on environmental protection.

Timor-Leste plans to implement nature-based solutions in agriculture and tourism as part of its climate mitigation and adaptation strategies, including for sustainable agriculture (smart agriculture, eco-agroforestry and sustainable aquaculture), carbon sequestration (green and blue carbon) and ecotourism. The approach will require workers to operate and manage the projects in industries that will be part of the value chain (especially financial services). Previous nature-based solutions initiatives showed some

success in improving agricultural productivity, leading to an increase in the demand for workers. The magnitude of employment or livelihood generation will be contingent upon international support and mechanisms (climate financing and carbon trading), while the quality of jobs created will need to be monitored.

Additionally, employment opportunities are also emerging in the following sectors, although limited in number and/or quality.

- ▶ **Waste management.** Employment opportunities from waste management are identified in the mitigation plan. However, given the current and planned scales, the impact will likely be limited, and there is concern about the quality of created jobs (working conditions, occupational hazards, precarity).
- ▶ **Climate financing.** The climate transition plan to optimize financing mechanisms will require skilled professionals in sustainable finance and environment sustainability to occupy roles, such as green financial analysts, environmental economist and sustainability experts. Although the number of jobs is limited, these positions offer high-quality employment.
- ▶ **Workforce qualifications.** The employment implications from the climate transition will occur across all skill levels. The analysis of the physical and transition risks to employment found the following patterns:
 - ▶ The workers needed for domestic renewable energy development are mostly skilled technicians for installation and operation and management due to the limited scale of the projects. Interventions to introduce renewable energy sources in the energy mix for on-grid systems via co-firing will change the activities related to fuel handling, but the technology will be similar, hence necessitating retraining for related power-generation workers. A more substantial reskilling would be required if a different technology is introduced, for example, for developing a biogas power plant. The strategy can create employment in the renewable energy supply chain (for example, agriculture and waste management labourers who supply biomass).
 - ▶ For the construction sector, most of the domestic job creation would likely be at the low- to medium-skill level, consisting of skilled manual workers and trade labourers who engage in infrastructure projects. Upskilling will be required for the high-skill positions, such as engineering and design, including engineers under the related government entity, in which the existing projects include capacity-building and field training as part of the project implementation for workers (see [ADB 2024, 41–44](#)). When considering jobs in foreign countries, there is potential to leverage the shortage of construction workers for the global energy transition via circular labour migration schemes, but alignment of workers' skills with the requirements and new skills recognition measures will be needed.
 - ▶ Many workers in nature-based solutions jobs are at the low- to medium-skill levels, primarily for project operation and maintenance. Although skilling is essential, these workers mostly do not need extensive upskilling; reskilling and capacity-building are often embedded in project implementation. However, high-skilled workers are needed for managerial and technical positions, such as project managers, field facilitators and operation managers (including agricultural extension workers) and environmental specialists.
 - ▶ For waste management, the workforce needed for the operational level, from waste collection to recycling processes, will mostly be at the low- to medium-skill levels. However, high-skilled workers will be needed for the management level, such as project management and facility management.
 - ▶ Climate financing will require a highly skilled workforce with expertise in sustainable finance, environmental economics and sustainability. These experts will be required in national financial institutions, policymaking (such as the Ministry of Finance and the National Designated Authority for Climate Change) and climate project management teams.

► Table 11. Emerging occupations and skill levels

Emerging industry	Emerging occupation	Skill level
Renewable energy	Renewable installer and operation and maintenance, co-fired or biomass power plant operator	Medium
Green construction	Construction labourer	Low to medium
	Design and engineering	High
Nature-based solutions: agriculture (sustainable agriculture, forestry and aquaculture and carbon sequestration) and tourism	Conservation worker, park ranger or monitoring worker, ecotourism facility worker, ecotourism guide	Low to medium
	Field facilitator, environment specialist, project or facility manager	High
Recycling and waste management	Waste picker and sorter, waste transporter, recycle traders and labourers	Low to medium
	Project or waste facility manager	High
Climate financing	Green finance analyst, environmental economist and sustainability consultant	High

Source: Own analysis

Although the skill needs for low- to medium-skill occupations in pilot projects can arguably be managed by embedding skilling components, investment in workforce development will be essential for sustainability and expansion.

Informed by labour market trends and the climate adaptation and transition policy plan and undertakings, investment in workforce development will be crucial for preparing a skilled workforce in the medium to long terms. At present, there are gaps that may affect those processes (SEFOPE 2022, 14), notably in construction, retail and hospitality, especially for construction workers with electrical, repair and installation, cashiers, carpenters and administration and finance specialists, as highlighted in the *Timor-Leste Enterprise and Skills Survey 2022*. Some of the skills gaps in these sectors are vital for the green transition, particularly in infrastructure development and tourism and are needed both in Timor-Leste and to fulfil foreign employment opportunities.⁵⁵

4.3 Poverty and inequality implications

4.3.1 Physical climate risk

A 2020 assessment of climate change on extreme poverty concluded that the health impacts and the increase of food prices are responsible for poverty increases (Jafino et al. 2020, 9). The resulting household food-coping strategies engender children, youths and people with disabilities more vulnerable due to nutrition, health care and education typically sacrificed to prioritize food consumption. Women and youths are prone to livelihood coping strategies because they are most likely to participate in additional livelihoods or to be sent away for labour migration.

⁵⁵ A recent report from Master Builders Australia (2024, 2, 13, 29), a peak organization for the construction sector, revealed that the sector is facing significant pressure to fulfil workforce requirements for community infrastructure projects. Skilled migrants are mentioned as an alternative solution, citing the Pacific Australia Labour Mobility Programme as one option.

Climate impacts increase gender disparities and gender-based violence. When interviewed, the SEFOPE and trade union representatives talked of the maladaptive coping mechanisms that create unintended consequences, including increasing domestic or workplace violence against women due to patriarchal norms and work precarity. Already Timor-Leste has one of the highest gender-based violence rates globally, with gender-based violence entrenched across generations and social norms having normalized the violence (The Asia Foundation 2019). During emergency situations, women have an increased risk of experiencing violence due to challenges in accessing services and assistance, such as water and clean cooking (Duerto-Valero and Kaul 2023; IOM 2023c). A 2021 Oxfam study found that women are highly vulnerable to climate change due to their reliance on natural resources, increased risk of violence and reduced access to health services during natural disasters (Oxfam 2021, 18). This vulnerability is exacerbated by unequal access to capital resources, discriminatory treatment and limited participation in decision-making processes. The National Adaptation Plan acknowledges these gender disparities and emphasizes the need to address them within programme implementation.

The climate change impacts also worsen the financial situation of vulnerable households in rural areas. A 2024 report from the World Food Programme indicates that vulnerable households often incur debt when facing shocks as part of their coping mechanisms (WFP 2024, 30), including to finance a family member for migration. With the lack of access to financial services due to the land regulation and collateral requirements, they rely on non-banking sources, such as relatives, traders or credit institutions (WFP 2023, 30; UN 2023, 19). For migrant workers, debt payment can take a massive portion of their remittances, making it difficult for the household to allocate the funds for productive spending that will help them move out of poverty (IOM 2023c; IOM 2019, 74).

A cultural belief that correlates disaster with communal redemption hinders climate change awareness and adaptive building but indicates the potential for local value adoption for programme implementation. The trade union and civil society organization informants suggested that a community's response to a climatic hazard is influenced by a cultural belief that hazards and disasters are the consequences of their misconduct rather than climate change. This observation aligns with previous research on redemptive legacies associated with ancestral religion and Christian beliefs, whereby the wealth of people requires sacrifice, long struggle and redemption by family members (McWilliam 2020, 9–10). Civil society organization representatives working on climate advocacy noted in the study interviews that approaches aligned with a community's beliefs are more effective in raising awareness. This encourages the potential of leveraging indigenous knowledge and approaches for climate adaptation and mitigation.

4.3.2 Transition risks and opportunities

The costs and benefits of national and global climate policies can vary, with some implementation potentially leading to unintended redistributive impacts. Additional regulations to limit carbon emissions from power generation will increase production costs, possibly leading to higher energy prices that disproportionately affect the poorest households. Deforestation measures that prohibit local communities from cutting wood or mangroves that supply their energy needs (Fraga et al. 2019) will hinder their access to energy if not accompanied with relevant support measures. A biodiversity policy that bars traditional fishers from fishing in protected areas without interventions providing them with alternative livelihoods may eliminate their source of subsistence.

Transition policies and programmes will also affect vulnerable groups by impacting the type and quantity of jobs available in the country. The Organisation for Economic Co-operation and Development (2021, 4) noted that even if small on aggregate, green policies can have important distributional implications for jobs at the sectoral or regional levels. For Timor-Leste, expanding renewable energy's potential for off-grid and on-grid generation could potentially provide employment or alternative livelihoods for agroforestry, services and construction workers engaged in the supply chain who are most likely from low-income rural households. Conversely, applying energy efficiency measures to existing diesel-power plants and the petroleum industry could potentially create limited jobs for workers with relevant skills. Investing in sustainable nature-based

solutions can improve agriculture-based and ecotourism livelihoods and create decent employment within these sectors, while continuing investment in petroleum may create employment in the short to medium terms, especially for medium- to high-skilled workers, but it may necessitate long-term planning to mitigate adverse employment impacts from the global petroleum industry decline, especially in oil regions.

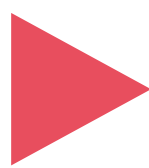
4.3.3 Summary of the poverty and inequality impacts and the role of social protection

The analysis reinforces how climate change affects vulnerable groups disproportionately. These people, who are already economically reliant on precarious informal economic activities and lack adequate protection, are forced into maladaptive coping mechanisms, such as reducing meals or sacrificing educational expenditures. Social norms further compound their vulnerability, leading to greater burdens for women, long-term effects for children, limited mobility for people with disabilities and older persons and discrimination against LGBTQIA+ individuals. This cumulative impact across systems and sectors highlights the need for targeted support and adaptive strategies to mitigate the adverse effects and promote resilience.

Green transitions can have uneven impact on vulnerable groups where the policy choice determines the implication. Measures to limit carbon emissions or protect biodiversity, for example, may inadvertently worsen inequality if not accompanied by supportive interventions. Additionally, climate measures can impact job distribution across regions and sectors. For instance, expanding renewable energy and sustainable agriculture can provide new employment opportunities, particularly for rural and low-income households, while pursuing energy efficiency to support the petroleum industry. But it may provide short- to medium-term solutions that necessitate planning for long-term adverse employment impact. The regional development impact will therefore depend on the choice of measures and their economic competitive advantage. In other words, the success of these transitions depends on careful and long-term planning, including workforce planning, to ensure that the benefits are equitably distributed and that vulnerable communities are protected.

Social protection has an important role for the vulnerable groups confronted by climate risks. Global evidence reflects the benefits of social protection to climate change adaptation and mitigation as reducing underlying vulnerabilities, responding to shocks and disasters, offsetting the negative welfare impacts of climate transition policies, facilitating and enabling climate change adaptation options and contributing to emissions reductions or carbon sequestration (ADB 2024). Adaptive-focused assistance is also pivotal for building up climate resilience (ILO 2024d, 28; World Bank 2023a, 16). The current focus in Timor-Leste, however, seems to be on short-term shock response. Anecdotally, in 2023, approximately 10 per cent of households received assistance from the Government, non-government organizations and development partners, and one in two households reported having experienced a shock in the previous six months (WFP 2023, 32–33). Some observers have questioned how the population receiving assistance is matched with the targeted vulnerability, such as geographic area and socio-economic condition, and how this mismatch may be further exacerbated by discrepancies in the delivery system (World Bank 2025b, 14).

Timor-Leste has a good starting point to develop an adaptive and climate-responsive social security system. Government spending on social protection is relatively high. The social protection legislation provides a legal foundation for the development of adaptive social protection and, in times of shocks, the country can use the contingency funds allocated within the State budget (World Bank 2023a, 11, 12). However, the limitation in fiscal room, including the small share of contributing social protection, requires a reprioritizing. Shifting the focus of the social security programme from short-term disaster response to a medium- and long-term adaptive or climate response strategy that can help build resilience is a possible alternative. Incorporating vulnerability assessments and evaluations from previous programmes to improve the targeting mechanisms as well as addressing the fragmented delivery system would be a good starting point. To address the negative employment and livelihood consequences, social protection design should be improved to include a combination of social assistance, social insurance and active labour market policies, such as the provision of conditional cash transfers tied to climate adaptation, training access and unemployment benefits or support that targets affected communities and workers.



5

Strategic economic activities and policy options to support the climate transition

Climate-related physical impacts and transitions are reshaping the economy and labour market, creating both threats and opportunities in Timor-Leste. Women, children and vulnerable groups are especially affected as the climate risks disrupt their livelihoods and exacerbate poverty and inequality.

The study for this paper indicates that, despite the challenges, opportunities can be leveraged while pursuing economic diversification and employment generation, thus tempering the adverse employment impacts and strengthening climate resilience.

This chapter discusses the economic activities found to be most promising, together with selected policy options that cater to their development. It also provides cross-cutting recommendations for interventions that will smoothen the change.

5.1 Strategic economic activities and policy options

Table 12 summarizes the recommended strategic economic activities with policy options that could enable their development. The economic activities are clustered in three main pathways:

- ▶ Nature-based solutions⁵⁶ applied to specific economic activities, such as sustainable agriculture, forestry and livestock farming, sustainable fisheries and aquaculture, carbon sequestration and sustainable tourism.
- ▶ Renewable energy sources, including power generation and the construction of renewable energy infrastructure in foreign countries.
- ▶ Climate resilience infrastructure, infrastructure for climate resilience and green construction.

For each of these, the strategic economic relevance and contribution to adaptation, mitigation and economic diversification is elaborated in the “strategic value” column, while opportunities in the national or international economic landscape and policy choices are spelled out in the “opportunities” column. Suggested policy interventions for the short term (less than one year) and longer term (one to five years) are presented in the last two columns.

⁵⁶ Here, too, and consistently with the NDC (2022) and the National Adaptation Plan (2021), we refer to the policy objective of implementing nature-based solutions in these four specific areas, even though the two concepts do not necessarily and fully overlap. For instance, sustainable farming does not always entail nature-based solutions and the same is true for fisheries.

► Table 12. Sectors with green employment potential and the recommended sector-specific policy options

Pathway	Subsectors	Strategic value	Opportunities	Short-term policy option (within 1 year)	Mid-term policy option (1–5 years)
Nature-based solutions	Sustainable agriculture, forestry and livestock farming	The agriculture sector is crucial for food security, biodiversity conservation and climate resilience. It is an important economic sector, providing significant employment and non-oil GDP contributions, especially in rural areas. The sector offers feasible options for economic diversification and is prioritized in climate actions under adaptation and mitigation programmes and the climate transition strategy. Additionally, it offers opportunity for inclusive employment by providing alternative livelihoods and/or employment for women and youths.	► Evidence from previous piloting initiatives shows that climate resilience practices or techniques, such as conservation agriculture, agroforestry, climate-smart agriculture, organic farming and circularity, that are tailored to local conditions have considerable potential to improve productivity by enhancing sector resilience, cost reduction and overall farming efficiency. Indirectly, the approach can promote upgrading subsistence farming when accompanied with dedicated business support services, human resources development and measures instrumental to expanding social security. ► Commodity diversification using (a) sustainable agricultural practices (such as organic farming and (b) intensification farming via multi-cropping, system diversification) can be conducive to the production of commodities that are climate-resilient and of higher-value, thus contributing to export-oriented production (coffee, coconuts, vanilla, large livestock and teakwood) and food crops production. By substituting imports, it can improve national food security (maize, rice, vegetables, small and medium livestock). ► Providing goods and services needed for sustainable agriculture, including organic fertilizer (producer and distributor), seed banks and agricultural extension services.	► Augment the allocation for public expenditure for agricultural climate-proofed infrastructure and connectivity development. ► Coordinate international assistance for agriculture infrastructure development, including water and irrigation systems. ► Assess the market system development approach in the agricultural (including fisheries) value chain, integrating sustainable agriculture practices and local component conditionality. ► Recognize Tara Bandu in regulations and policies. ► Take stock of the applications for environmental licensing to fisheries development, including international applicants through.^b	► Provide incentives for private investment in sustainable agriculture, forestry, fisheries and aquaculture, including support for participating in government programmes or contracts (for nurseries, seed bank and other services or activities to support sustainable agriculture, forestry and livestock farming and fisheries and aquaculture). ► Strengthen extension services to include climate-smart and sustainable agricultural and fisheries practices. ► Promote green entrepreneurship by providing access to finance, capacity development, business incubation programmes and supportive regulatory frameworks, informed by the market system and development assessments.^c ► Attract investment for food processing manufacturing development to optimize domestic agriculture and fisheries and aquaculture products' value.^d

Pathway	Subsectors	Strategic value	Opportunities	Short-term policy option (within 1 year)	Mid-term policy option (1–5 years)
Nature-based solutions (cont.)	Sustainable fisheries and aquaculture	Currently, Timor-Leste makes limited use of its marine potential. Although unconditional exploitation of those resources via agreement with foreign investors is certainly not the way forward, sustainable fisheries and aquaculture can enhance the long-term livelihoods of coastal communities while preserving biodiversity and ecosystem conservation. This can also improve communities' resilience to climate change. Note the risk that, if mismanaged, these practices can provide short-term benefits to a selected few, including foreign investors. As with other sustainable agriculture, it offers inclusive employment opportunity.	▶ The reintroduction of Tara Bandu has shown potential in allowing people to exploit marine resources while preserving biodiversity. ▶ Climate and environment-friendly technology can help fishers improve productivity and promote subsistence fishers to engage commercially in the sector.^e ▶ Promote sustainable aquaculture commodities to meet the need for national alternative protein sources and exports (seaweed and algae). Fisheries and aquaculture products can also contribute to the development of the food and beverage processing industry.		

Pathway	Subsectors	Strategic value	Opportunities	Short-term policy option (within 1 year)	Mid-term policy option (1–5 years)
Nature-based solutions (cont.)	Carbon sequestration	Timor-Leste's development and climate strategies include carbon sequestration in coastal, marine and forest areas (known as blue and green carbon), with the country having experience in forestry carbon farming under the voluntary market mechanism. The enactment of article 6 of the UNFCCC presents chances to access broader resources and enhance governance. Nevertheless, the absence of good governance and inclusive design will only benefit a selected few and will promote precarity and inequality.	▶ Carbon sequestration projects in forest and marine areas (mangrove, seagrass bed and salt marshes) can generate jobs across different skills level, such as conservation workers and park rangers, which require low to medium skill; and high-skill occupations, such as field facilitators, project managers, environmental analysts and climate financing experts, which represents high-quality jobs for Timorese. ▶ Progress in the carbon market via the international carbon market under UNFCCC article 6 and access to the voluntary market for economic incentive creation.	▶ Improve the governance and institutional settings to support the carbon sequestration programme through approval of the Climate Change Base Law.	▶ Design a climate action-linked public employment programme or public works for adaptation actions, focusing on carbon sequestration (nature-based solutions) and climate-proof infrastructure development based on climate vulnerability assessment. ▶ Monitor and evaluate implementation of the carbon sequestration programme (individual projects). ▶ Improve capacities of the adjacent services (public sector and financial service).
	Sustainable tourism and ecotourism	The country's marine area is part of the coral reef triangle, rich in biodiversity. Foreign direct investments in the tourism sector indicates investor commitment and confidence in tourism development.	Promotion of community-based nature tourism using the nature-based solutions approach, including linking to innovative financing mechanisms, such as payment for environmental services, the conservation fund in addition to revenue stream from ticketing and concessional fee.	▶ Include a climate vulnerability assessment when identifying tourism destinations (as per the tourism policy). ▶ Determine how to implement nature-based solutions in tourism. Choose attractions via the vulnerability assessment (as per the tourism policy).	▶ Create incentives for private sector investment. ▶ Provide systematic capacity-building for local communities on sustainable tourism. ▶ Facilitate access to alternative financing (see footnote 54).

Pathway	Subsectors	Strategic value	Opportunities	Short-term policy option (within 1 year)	Mid-term policy option (1–5 years)
Renewable energy sources	Power generation	The mitigation and low-carbon transition plans include renewable energy as one strategy to provide energy access for off-grid rural communities, conditional on international assistance. Beyond the plan, Timor-Leste has abundant renewable energy potential and must mobilize it into the national energy system to help reduce electricity-generation costs, which currently depend on diesel imports, while reducing carbon emissions.	▶ Currently, most renewable energy programmes are contingent on international assistance. However, ongoing initiatives, like photovoltaic development, show potential for expansion, particularly to provide electricity for off-grid rural areas. This will create employment opportunities for installers, operators, maintenance workers and organization-support roles. ▶ Greater opportunities exist if biomass is incorporated in the current electricity generation mix, specifically if sourced from agricultural and solid waste.	▶ Produce cost-benefit or effectiveness analysis of renewable energy utilization that considers the economic, social and environmental implications. ▶ Identify existing piloting projects utilizing renewable energy that can be expanded to other areas.	Support investment in selected renewable energy projects based on cost-benefit or effectiveness analysis, including by creating incentives for private sector investment or mechanism for public–private partnerships for renewable energy projects.
	Power generation – construction and migrant workers	International labour migration is critical in the National Economic Strategy as an alternative solution for formal employment creation and upskilling the workforce.	Global renewable energy development creates international labour shortages in the construction sector, opening opportunities for labour migration for Timor-Leste workers to neighbouring and more developed countries, such as Australia and ASEAN Member States.	Explore possibility to establish dedicated labour mobility partnership with targeted countries.	▶ Leverage ASEAN membership to tap in labour market opportunities in ASEAN Member States. ▶ Embed capacity improvements linked to green construction in future labour mobility schemes (in the country or abroad).

Pathway	Subsectors	Strategic value	Opportunities	Short-term policy option (within 1 year)	Mid-term policy option (1–5 years)
Climate-resilient infrastructure	Construction	Critical infrastructure for climate resilience (for example, water and sanitation, flood protection) as well as climate-resilient infrastructure (especially irrigation systems, roads and seaports) are critical especially for climate adaptation while improving productivity.	Infrastructure development projects will increase demand in the construction sector, creating employment opportunities for workers with low- to medium-skill levels, as well as high-skill roles, especially in engineering and design. Additionally, utilizing green material, design and technology (such as green construction) can create additional benefits in mitigating carbon emissions.	Identify the most urgent needs for climate resilience infrastructure across the public domain.	▶ Design a climate action-linked public employment programme or public works for adaptation actions, ▶ Design regulations or provisions that promote small-scale contractor development in the public employment programme or public works for climate infrastructure. ▶ Revise building code to ensure climate resilience and energy efficiency, alternatively by referring to the sustainable construction standards and practices. ▶ Include environmental safeguards into public procurement process.

Note:

- ^a The market systems development approach seeks to make market systems more inclusive and sustainable by identifying and addressing systemic constraints that prevent poor and marginalized groups from benefiting from economic opportunities; hence, it goes beyond market access and addresses issues like access to inputs, incentive structures, market failures, etc. Implementing market system development approaches will identify bottlenecks and leverage points for growth, increase productivity and incomes and improve resilience in the agricultural value chain. The first step of market system development is analysis to identify high-potential sectors and value chains for interventions. A recent ILO report documents that the market systems development approach can help developing economies achieve a just transition, including optimizing the employment opportunities from the designated climate action (Bird 2024).
- ^b Decree-Law No. 41/2022 created the National Environmental Licensing Authority, I.P., which corresponds to the Environmental Authority provided for in the legislation governing environmental licensing. The Environmental Basic Law No. 26/2012 and Decree-Law 5/2011 on Environmental Licensing provide general legal requirements for environmental impact assessments, while Decree Law 6/2004 on Fisheries and Aquacultures includes sustainability and compliance with the environmental laws. Specific procedures for the fisheries sector are not provided within the environmental impact assessment guidance for small-scale projects that thus generally are exempted but subject to monitoring and local management (Schmidt n.d., 5). A stocktaking of the licenses supplied by the Licensing Authority since its creation, an assessment of the economic and employment benefits versus potential environmental impacts, as well as an assessment of the mechanism to enforce the regulation, could be the basis for further expansion of the sector.
- ^c Promoting entrepreneurship can help with economic diversification, especially considering the demographic profile and lack of employment opportunities. Nature-based solutions can be an alternative avenue, with the expected economic impact from the climate transition and the increasing interest of younger generations in environmental issues. Additionally, several pilot projects have found that green solutions related to nature-based solutions in agriculture promoted young entrepreneurs (UN 2024; da Silva and Gomes 2023).
- ^d The Strategic Development Plan identifies basic food and beverage manufacturing as areas with economic diversification and employment-creation opportunities, while TradeInvest noted that the processing industry for food production and small-scale manufacturing have investment opportunities. Agriculture development can be strengthened by creating demand while contributing to solving the food insecurity problem.
- ^e Most of the fishers in Timor-Leste are either traditional or subsistence fishers who rely on traditional techniques and technology. The Ministry of Agriculture, Livestock, Forestry and Fisheries, in cooperation with development partners and the private sector, has been developing a digitized monitoring and analytics system via PeskAAS – a near real-time and open-source monitoring and analytics system for small-scale fisheries and the IKAN Adapt Project, which is a Global Environment Facility-funded project to strengthen adaptive capacities for fisheries and aquaculture-dependent livelihoods. It includes capacity development and climate and biodiversity-related information systems, information management and monitoring operations (GDRTL 2022a, 17–18).

5.2 Cross-cutting interventions to support climate transition

In addition to the dedicated support to selected economic activities presented in the previous section, there are several cross-cutting recommendations instrumental to achieving the objective of low-carbon and climate-resilient transition in Timor-Leste.

a. Continue to invest in climate diplomacy to expand access to finance, technology and capacities.

Timor-Leste should continue to leverage climate diplomacy and its status as a low-income Small Island Developing State to secure international financing and increase climate funding inflows to support technology, infrastructure, private sector development, agriculture and human resources development. Improved governance and effective project implementation are crucial for achieving the desired goals sustainably.

b. Involve communities and leverage local knowledge.

Involving local communities and utilizing their knowledge is essential for climate actions and resilience. Systematically (and possibly mandatorily) ensuring community participation in policy design processes and implementation, especially by marginalized groups, leads to better outcomes. Ownership is the starting point, which can ensure ingraining local values and customs, such as Tara Bandu, into the policies and implementation.

c. Integrate and mutually reinforce international migration schemes and climate actions.

The many links between climate actions, just transition principles and the national strategy for labour mobility go beyond the interventions proposed in table 12. For instance, in the medium-term framework, the following can be considered:

- ▶ International labour mobility can generate remittances that support adaptation, development and capacity-building for communities in origin areas, upskill migrant workers for improving future employment prospects and enhance skills development for climate transition. Leveraging remittances strategically could also be pursued with dedicated schemes.
- ▶ There is scope for expanding the portfolio of reintegration services to include access to finance, green skilling and labour market information.
- ▶ Expanding labour mobility programmes in sectors related to the climate transition or the national low-carbon transition strategy, such as construction, agriculture and renewable energy, will help returning migrants envisage re-employment in Timor-Leste.
- ▶ Improve recognition of skills that are instrumental to the climate transition or the national low-carbon transition strategy by embedding a skilling programme into labour mobility partnerships and engaging the technical and vocational education and training (TVET) programme.

d. Optimize the TVET system and invest in higher education for skilling.

Timor-Leste can leverage its TVET system to optimize employment opportunities for workers in manual technical roles in the domestic labour market and embedding it with skill recognition measures for the international labour market. Additionally, investing in higher education, particularly in environmental sciences, engineering, business and management, is essential for long-term economic development, with a focus on improving access for vulnerable groups.

► **Table 13. Policy options for optimizing the TVET system and higher education**

Policy option	Time frame
► Map skill needs as part of workforce planning for the identified sectors (agriculture, tourism, renewable energy, construction), in close coordination with the sector actors.	Short term
► Embed a capacity-development component in climate action programmes to fill short-term needs.	
► Leverage TVET to provide skilling for medium-skilled labour needs based on the skill needs assessment.	Medium to long term
► Invest in higher education, especially in critical fields, such as environmental science, engineering, business management and finance.	
► Align environmental awareness with the core skills in green jobs for formal education.	

e. Build up adaptive social protection that is aligned with active labour market policies.

Shifting the social protection system focus from short-term responses to a longer-term view by building an adaptive social security strategy enhances resilience and supports long-term climate adaptation. Timor-Leste can consider the following policy options and interventions.

► **Table 14. Policy options for adaptive social protections**

Strategy	Policy option	Time frame
Building up adaptive social protection for climate-resilience communities	► Align disaster risk management policies, adaptation policy and regulation with adaptive social protection provision (legal basis exists but programmes are still more responsive than adaptive).	Short term
	► Evaluate the current social protection programmes' coverage and spending rate for improving spending efficiency, and design adaptive social protection provisions.	
	► Develop an inclusive adaptive social protection strategy as part of the National Social Protection Strategy action programme.	Medium to long terms
	► Assess future needs of an adaptive social protection fund based on climate scenarios and evaluate funding availability.	
	► Develop a protocol and scalability framework for adaptive social protection programmes for shock response and promoting household resilience.	
	► Strengthen early warning systems, and link them to adaptive social protection as part of monitoring and evaluation.	

Strategy	Policy option	Time frame
Aligning social protection and labour policies with support for the green transition	▶ Align just transition planning, climate action policies and development policies with adaptive social protection provisions.	Short term
	▶ Design unemployment protection, accounting for the specificities of climate-induced job loss.	Medium to long terms
	▶ Include climate action interventions in social protection programmes (linked to public employment services).	
	▶ Design social insurance for climate-related risks in the agriculture sector to ensure farmers' resilience.	

f. Align existing policies with workforce development.

Although there has been progress to improve governance and provide an encompassing policy to guide climate actions, alignment with the employment component is missing. To optimize employment generation from climate actions, Timor-Leste should align workforce development with climate, industrial and economic policies and facilitate coordination through the Ministerial Council and social dialogue for sector-wide coherence. Additionally, the National Economic Strategy needs to address the climate change risks and strategies to mitigate them while enhancing (green) job opportunities. This effort requires stronger policy coordination and social dialogue (see dedicated suggestions in Annex II). Inclusion of employment stakeholders in policy planning and coordination for climate action is critical. Creating institutional setting for social dialogue within climate actions implementation that include the private sector, workers and local communities should be pursued to strengthen the existing in-place mechanism.

g. Anchor just transition principles in high-level policies and regulations.

There is weak linkage between climate and employment policies, and just transition principles are not yet recognized in law or international commitments. With Timor-Leste finalizing its Climate Change Base Law and developing the second NDC, it is strategic to anchor the just transition principles within these documents. This will provide a high-level directive and strategy to achieve justice and ensure that no one is left behind from climate actions. It will also lay the foundation for aligning policies across different domains and for promoting coherence and inclusivity in the climate and employment policies.

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Annex I Interviewees

Organization	Name and position
1. Ministry of Foreign Affairs and Cooperation	Adão Barbosa, Climate Change Ambassador
2. Ministry of Tourism and Environment	Joao Carlos Soares, National Director for Climate Change
3. Konfederasaun Sindikatu Timor-Leste (Trade Union Confederation of Timor-Leste, KSTL)	▶ Serafico Natalino Soares, Vice President ▶ Eduarda Miranda Branco, Women Commission
4. Camara de Comercio e Industria de Timor-Leste (Chamber of Commerce of Timor-Leste, CCITL)	▶ Domingos Natividades (Executive Director) ▶ Franquelino da Costa (Vice president Labor and training)
5. Secretariat of State for Vocational Training and Employment (SEFOPE)	▶ Paul Alves, Executive Director National Economic Strategy ▶ Geraldo Moniz, National Director for Labour Market Information ▶ Belarmino da Cruz, National Directorate for Labor Relations ▶ Gil da Costa, National Directorate for Labor Relations) ▶ Angelo Veloso ▶ Jenifer Pui
6. National Designated Authority (NDA) for Climate Change	Felizberto Araujo, President
7. Timor-Leste Coalition for Diversity and Action (CODIVA)	▶ Romiaty da Costa Bareto, Executive Director ▶ Julio do Carmo, Program Officer ▶ Elan da Cruz, Field Officer
8. Community Based Rehabilitation Network Timor-Leste (CBRN-TL)	▶ Norberta Soares, Executive Director ▶ David Muganga
9. Haburas Foundation	Deometrio Carvalho, Founder
10. Ministry of Agriculture, Livestock, Fisheries and Forestry	Lucio Nuno, National Director of Agriculture, Holticulture and Plants Protection
11. Food and Agriculture Organization of the United Nations	Pedro da Costa, Consultant Coordinator
12. Laudato Si' Movement Timor-Leste	▶ Dircia Belo, Founder ▶ Isaura Baptista, Founding member and Coordinator ▶ José António Xavier da Silva, Finance Coordinator

Annex II Recommended policy options and national employment strategy pillars

Based on the featured policy options in Chapter 5, the following table links them with the National Employment Strategy pillars:

- ▶ **Pillar 1: Increasing labour market demand.** The demand-side strategy focuses on four areas: (a) promoting private sector employment aligned with the economic diversification strategy; (b) labour migration, (c) maximizing the employment generation from government infrastructure spending; and (d) local potential development (such as tourism or the petroleum-based industry).
- ▶ **Pillar 2: Improving labour market supply.** The supply side is implemented by aligning the National Employment Strategy with the human resources development strategy, continuation of the TVET plan implementation, strengthening the links between the Ministry of Education and SEFOPE, improving training centres, strengthening higher education, improving the social protection system and promoting gender equality.
- ▶ **Pillar 3: Strengthening labour market institutions.** This pillar includes a strategy to strengthen active labour market policies, improving coordination structures, strengthening the labour market information system, linking jobseekers and employment opportunities and reviewing labour legislation.

► Link of policy options with the National Employment Strategy pillars

Policy options	Recommended intervention	Sector	National Employment Strategy pillar
Create an enabling environment to promote investment in the potential sectors	▶ Augment the allocation for public expenditure for agricultural climate-proofed infrastructure and connectivity development. ▶ Coordinate international assistance for agriculture infrastructure development, including water and irrigation system. ▶ Recognize Tara Bandu in regulations and policies. ▶ Revisit any fishery development (international) agreement to incorporate environmental impact assessment. ▶ Improve the governance and institutional settings to support the carbon sequestration programme through approval of the Climate Change Base Law. ▶ Improve the capacity of the public sector and financial services to interact for climate financing purposes.	Nature-based solutions for agriculture	Institutional or labour demand
	▶ Include a climate vulnerability assessment when identifying tourism destinations (as per the tourism policy).	Nature-based solutions for tourism	
	▶ Produce cost-benefit or effectiveness analysis of renewable energy utilization that considers the economic, social and environmental implications. ▶ Identify existing piloting projects utilizing renewable energy that can be expanded to other areas. ▶ Explore the possibility to establish dedicated labour mobility partnership with targeted countries. ▶ Leverage ASEAN membership to tap in labour market opportunity in ASEAN Member States. ▶ Embed in future labour mobility schemes capacitation (in the country or abroad) linked to green construction.	Renewable energy	
	▶ Identify the most urgent needs for climate resilience infrastructure across the public domain. ▶ Revise the building code to ensure climate resilience and energy efficiency, alternatively by referring to the sustainable construction standards and practices.	Infrastructure	

Policy options	Recommended intervention	Sector	National Employment Strategy pillar
Promote private sector development to support climate transition	▶ Provide incentives for private investment in sustainable agriculture, forestry, fisheries and aquaculture, including support for participating in government programmes or contracts (for nurseries, seed bank and other services or activities to support sustainable agriculture, forestry and livestock farming and fisheries and aquaculture). ▶ Strengthen extension services to include climate-smart and sustainable agricultural and fisheries practices. ▶ Assess the market systems development approach in agricultural (including fisheries) value chain, integrating sustainable agriculture practice and local component conditionality. ▶ Promote green entrepreneurship by providing access to finance, capacity development, business incubation programmes and supportive regulatory frameworks that are informed by the market system and development assessments. ▶ Attract investment for food processing manufacturing development to optimize domestic agriculture and fisheries and aquaculture products' value.	Nature-based solutions for agriculture	Labour demand
	▶ Create incentives for private investment. ▶ Provide systematic capacity-building for local communities on sustainable tourism. ▶ Facilitate access to alternative financing to support nature-based solutions in tourism (ecotourism). ▶ Monitor and evaluate implementation of the carbon sequestration programme (individual projects).	Nature-based solutions for tourism	
	▶ Support investment in selected renewable energy projects, based on the cost-benefit and effectiveness analysis, including by creating incentives for private investment or a mechanism for public-private partnerships for renewable energy project.	Renewable energy	
Green procurement for government contract	▶ Include environmental safeguards in public procurement processes.	Infrastructure	Labour demand
Climate-action linked public employment programmes	▶ Design a climate action-linked public employment programme or public works for adaptation actions, focusing on carbon sequestration (nature-based solutions) and climate-proofed infrastructure development based on climate vulnerability assessment. ▶ Monitor and evaluate implementation of the carbon sequestration programme (individual projects).	Nature-based solutions for agriculture and infrastructure	Labour demand

Policy options	Recommended intervention	Sector	National Employment Strategy pillar
Climate-actions linked labour mobility strategy	▶ Generate remittances that support adaptation, development and capacity-building for communities at origin areas through international labour mobility. Upskill migrant workers to improve their future employment prospects, and enhance skills development for climate transition. Leveraging remittances strategically could also be pursued with dedicated schemes. ▶ Expand the portfolio of reintegration service to include access to finance, green skilling and labour market information. ▶ Expand labour mobility programmes in sectors related to the climate transition or the national low-carbon transition strategy, such as construction, agriculture and renewable energy so that returning migrants can envisage re-employment in Timor-Leste. ▶ Improve recognition of skills that are instrumental to the climate transition or the national low-carbon transition strategy by embedding a skilling programme in the labour mobility partnerships and engaging the TVET programme.	Economy-wide	Labour demand
Green skill development and training programmes	▶ Map skill needs as part of workforce planning for targeted sectors, in close coordination with the sector. ▶ Embed a capacity-development component in climate action programmes to fill short-term needs. ▶ Leverage TVET to provide skilling for medium-skill labour needs, based on the skill needs assessment for green jobs or the low-carbon transition. ▶ Invest in higher education to improve the quality of the curricula and include a class or a curriculum in critical fields, such as environmental science, engineering, business management and finance. ▶ Align environmental awareness with the core skills in green jobs for formal education.	Economy-wide	Labour supply
Just transition planning	▶ Mainstream the just transition principles and employment policy directives within high-level policy and climate commitments, such as the Climate Change Base Law, the second NDC and communications to the UNFCCC. ▶ Improve the coherency between the Climate Change Policy, the Employment Strategy and the Industrial Policy and include climate actions in all of them while considering the employment dynamics. ▶ Include employment stakeholders in policy planning and coordination for climate action. ▶ Create an institutional setting for social dialogue within climate action implementation that includes the private sector, workers and local communities.	Economy-wide	Institutional

Policy options	Recommended intervention	Sector	National Employment Strategy pillar
Building adaptive social protection for climate-resilient communities	▶ Align disaster risk management policies, adaptation policies and regulations with adaptive social protection provision. ▶ Evaluate the social protection programme, especially on coverage and the spending rate between programmes to provide the basis for improving spending efficiency and mapping the adaptive social protection provision. ▶ Develop an inclusive adaptive social protection strategy as part of the National Social Protection Strategy action programme. ▶ Assess future needs of the Adaptive Social Protection Fund, based on climate scenarios; evaluate funding availability. ▶ Develop a protocol and scalability framework for an adaptive social protection programme for shock response and promoting household resilience. ▶ Strengthen early warning systems and including them as tools to monitor progress to establish adaptive social protection system.	Economy-wide	Institutional
Align social protection and labour policies to support the green transition	▶ Align just transition planning, climate action policies and the development of policies with adaptive social protection provision. ▶ Design unemployment protection for climate-induced job losses, such as agricultural workers (including forestry and fisheries) and petroleum workers. ▶ Include climate actions interventions in social protection programmes (linked to public employment services), such as the rehabilitation or restoration of landscapes and coasts, reforestation or conservation. ▶ Design social insurance for climate-related risks in the agriculture sector.	Economy-wide	Institutional
Strengthen stakeholder engagement to support climate transition.	▶ Continue to invest in climate diplomacy to expand access to finance, technology and capacity development. ▶ Involve communities and leverage local knowledge. ▶ Systematically (and possibly mandatorily) ensure community participation in policy design processes and implementation.	Economy-wide	Institutional

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